

## II. MUNICIPAL SOLID WASTE AND LANDFILL CAPACITY IN DELAWARE

Delawareans landfilled almost one million tons of municipal solid waste (MSW) in 2004 and this number is expected to rise as the state's population and economy continue to grow. Already, waste generation has increased faster than originally predicted just three years ago. This has caused landfill capacity projections to be revised and adds new urgency to the search for solutions to future disposal needs, particularly in New Castle County where the main landfill is predicted to reach capacity by the end of 2009. The following discussion reviews the current system for managing MSW in the State and examines proposed options for future management, including landfill expansion and mandatory residential recycling.

### A. BACKGROUND

Municipal solid waste, or MSW, is commonly known as garbage or trash. It consists of everyday items such as product packaging, grass clippings, furniture, clothing, food scraps, office and classroom paper, bottles and cans, boxes, wood pallets, newspapers, appliances, automobile tires, consumer electronics, and batteries.<sup>1</sup> MSW does not include construction and demolition debris, automobiles, biosolids (sewage sludge), or industrial process wastes. Even though these materials may sometimes be disposed in municipal waste landfills, they are handled and considered separately from MSW. Sources of MSW include residential (homes), institutional (schools, libraries, prisons), commercial (offices, restaurants, small businesses), and some industrial sources. While the state's landfills accept a small amount of non-MSW, for purposes of this report, all landfilled waste will be considered MSW.

MSW is often categorized as durable goods (e.g., appliances, furniture, carpets, tires, batteries), nondurable goods (e.g., newspapers, magazines, office papers, junk mail, disposable diapers, clothing), containers and packaging, and other wastes (i.e., yard wastes, food wastes, and miscellaneous).

Franklin Associates, a consulting firm that conducts a national MSW report annually for the U.S. EPA, completed a similar study for the DSWA in September 2002 in order to quantify and characterize MSW generation, resource recovery and disposal in Delaware.<sup>2</sup> The study broke down the composition of Delaware's municipal solid waste as follows:

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<sup>1</sup> U.S. EPA, *Municipal Solid Waste in the United States: 2001 Facts and Figures*, October 2003

<sup>2</sup> Franklin Associates, Ltd., *Assessment of Delaware Solid Waste Discards in 2000 and the Potential for Recycling of Materials*, September 2002

**Table 1: Composition of Delaware MSW**

Waste Category	Percentage of MSW Waste Stream
Durable Goods	14.3
Nondurable Goods	21.6
Glass Packaging	3.2
Steel Packaging	1.0
Aluminum Packaging	0.7
Paper and Board Packaging	15.3
Plastics Packaging	3.9
Yard Waste	26.1
Food Waste	9.6
All Other Wastes	4.4

Of the MSW generated in Delaware, approximately 60 percent of the waste stream is generated by the residential sector, with the remaining 40 percent contributed by the commercial sector.<sup>3</sup> These percentages are similar to those for the nation as a whole.

Over the past forty years, MSW generation across the country has grown from 88 million tons in 1960 to 230 million tons in 2001.<sup>4</sup> This is partly a function of a growing population. But the rate of generation, measured per capita, has also almost doubled from 2.7 pounds per person per day in 1960 to 4.6 pounds per person per day in 2001.<sup>5</sup>

Delawareans, too, are generating more MSW at a faster rate. In fiscal year (FY) 2000,<sup>6</sup> DSWA reported landfilling statewide a total of 843,000 tons of MSW, including some non-municipal solid waste. By FY 2004, the total landfilled had risen to nearly 995,000 tons (64 percent of which was disposed of at the Cherry Island Landfill) – an eighteen percent increase in MSW generation in only four years. The following chart shows the actual amount of MSW landfilled in Delaware in FY 2000 and projected amounts for FY 2005 and the next twenty years. In order to estimate future landfill demands, two compound annual growth rates (CAGRs) were utilized. The more conservative CAGR of 0.37 percent is based on 1997 U.S. Census population projections for Delaware.<sup>7</sup> The more aggressive CAGR of 1.37 percent was calculated using actual population growth for Delaware since July 2000.<sup>8</sup> Assuming current MSW management practices, Delaware's annual landfilling needs are projected to grow to between 1,017,000 and 1,080,000 million tons by 2010 and to between 1,075,000 and 1,324,000 million tons by 2025. Given the actual growth in tons landfilled observed over the last five years, the projected values may be on the low side.

<sup>3</sup> Franklin Associates, Ltd., *Assessment of Delaware Solid Waste Discards in 2000 and the Potential for Recycling of Materials*, September 2002, p. ES-6

<sup>4</sup> U.S. EPA, *Municipal Solid Waste in the United States: 2001 Facts and Figures*, October 2003

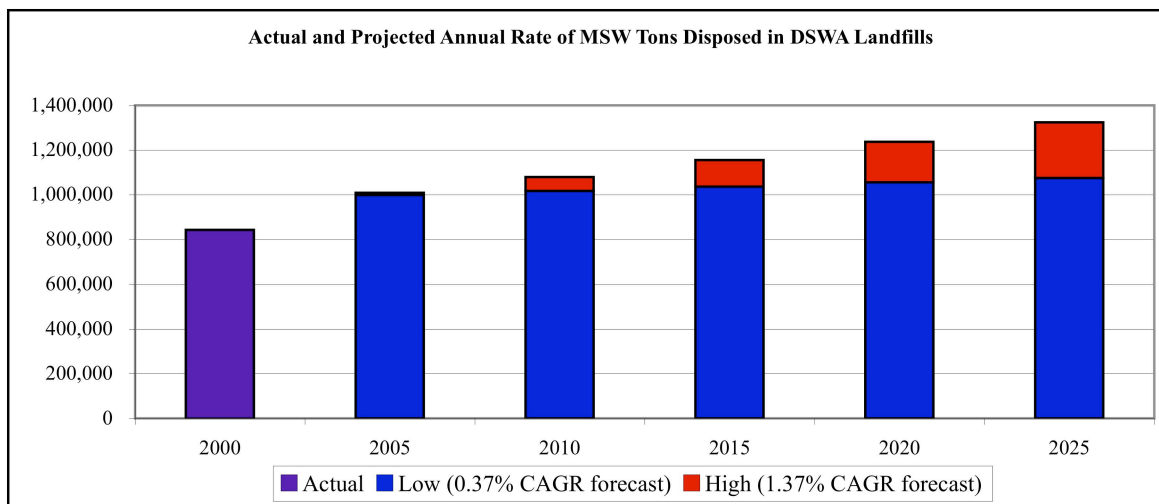
<sup>5</sup> Ibid

<sup>6</sup> DSWA maintains its records on a fiscal year of July to June, rather than a calendar year.

<sup>7</sup> U.S. Department of Commerce, *Population Projections: States, 1995-2025*, May 1997

<sup>8</sup> U.S. Department of Commerce, *Annual Estimates of the Population for the United States, and for Puerto Rico: April 1, 2000 to July 1, 2004*, December 2004

**Chart 1**



## **B. MSW MANAGEMENT IN DELAWARE**

### **1. Delaware Solid Waste Authority**

Until the early 1970s, Delaware’s municipal solid waste was managed haphazardly by local communities using an incoherent arrangement of public and private collection and open burning and dumping of trash as common disposal methods. Few safeguards existed to protect the environment from the hazards associated with land disposal or incineration. At this juncture, Governor Russell Peterson transferred responsibility for solid waste management from the Board of Health to the Department of Natural Resources and Environmental Control (DNREC).<sup>9</sup> In August 1974, DNREC completed the “State Plan for Solid Waste Management” which recommended the formation of a statewide authority to manage solid wastes on a statewide basis. Acting on this recommendation, the General Assembly established the Delaware Solid Waste Authority in August 1975, which began operating in 1976.

The enactment of Title 7 Delaware Code, Chapter 64, created the DSWA and charged it with implementing solid waste disposal and resource recovery systems and providing solid waste management services throughout the state. In addition to creating the Authority, the new legislation (under §6404(c)) included the establishment or development of:

- A statewide comprehensive program for management, storage, collection, transportation, utilization, processing and disposal of solid waste
- A program for the maximum recovery and reuse of materials and energy resources derived from solid wastes

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<sup>9</sup> Delaware General Assembly Joint Sunset Committee, *Joint Sunset Committee 2004 Final Report*, June 10, 2004

- A program for protecting the State's land, air, surface, and groundwater resources from depletion and degradation caused by improper disposal of solid waste
- A program for disposal of infectious waste, giving special attention to the management and operation of an infectious waste facility
- A program in cooperation with the U.S. EPA, or other federal and state agencies, for the demonstration of systems and techniques of materials recovery, market development, and reuse
- A statewide solid waste management plan, which provides the framework for DSWA to carry out its solid waste management responsibilities.

To achieve these aims and enable it to implement the statewide solid waste management plan, the legislature endowed the DSWA with many functions and powers, which include but are not limited to the following:

- Manage, operate and maintain solid waste disposal and resource recovery facilities;
- Provide solid waste management services, recover material and energy resources from solid wastes, and produce revenues from these services sufficient to support the Authority and its operations on a self-sustaining basis;
- Coordinate efforts directed toward source separation for recycling purposes and assist in the development of industries and commercial enterprises within the State based upon resource recovery, recycling and reuse;
- Develop and implement a licensing program for waste haulers;
- Set and charge reasonable fees for the services it performs;
- Determine the location and character of any project to be developed under Chapter 64 without the need to obtain land use approval;
- Issue bonds or notes to finance any project to meet the purposes of Chapter 64;
- Control the collection, transportation, storage and disposal of solid waste to facilities owned, operated or controlled by the Authority;
- Contract when possible with municipal, county and regional authorities, state agencies, individuals or firms to provide waste management services and to operate and maintain solid waste disposal and processing facilities.

#### **a. DSWA Board and Staff**

The DSWA is governed by a Board of Directors that is responsible for setting policy and making decisions regarding operations, programs and planning. The Board is also required to adopt a Statewide Solid Waste Management Plan to provide the framework for current and future solid waste management decisions.<sup>10</sup>

The Board of Directors consists of seven members appointed by the Governor. With the exception of the Chairman, who serves at the pleasure of the Governor, all board members must be confirmed by the Senate. Directors are appointed to three-year terms, although 5 of the 6 current members have served more than 10 years, and three have served 24 years or more. The composition of the board and the tenure of its members are issues that were raised by some of the individuals we interviewed who characterized the Board as “too

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<sup>10</sup> [www.dswa.com/about/about\\_board.htm](http://www.dswa.com/about/about_board.htm)

political” and in need of “a broader perspective.” It was suggested that one of the directors should have some experience in the solid waste industry.

Day-to-day management of the Authority is overseen by the Chief Executive Officer, N.C. Vasuki. The CEO is responsible for recommending the agency’s organizational structure, and for planning and implementing a comprehensive statewide solid waste management program.<sup>11</sup> Mr. Vasuki, who has announced his retirement, has served as CEO/General Manager since 1991 and prior to that served from 1976 to 1991 as General Manager. He is assisted in his managerial duties by the Chief Operating Officer, Pasquale Canzano, who has been with DSWA for 27 years, first as Chief of Engineering from 1977 to 1991, and from 1991 to the present in his current position.

Discussions with members of the waste hauling industry revealed a generally high regard for the DSWA management. Said one hauler, “Delaware is one of the better states to deal with. [DSWA] is the best run and you can get someone with decision-making authority on the phone. The same thing goes for DNREC.” Mr. Vasuki was described as well respected throughout the country for being innovative, open-minded and knowledgeable regarding approaches to waste management. Some outside the industry criticized the Authority for emphasizing revenues over landfilling alternatives.

#### **b. Statewide Solid Waste Management Plan (SSWMP)**

The Authority is responsible for developing, adopting and implementing Delaware’s Statewide Solid Waste Management Plan (SSWMP). The Plan represents the framework for DSWA to carry out its responsibilities for planning and managing the State’s solid waste. The last comprehensive plan was issued in 1994, with amendments to the Plan having occurred periodically following the public notice and hearing process. In addition, DSWA has issued annual and subject-specific reports that deal with emerging issues. While it is now outdated, the 1994 plan provided direction that has influenced DSWA’s planning and operations over the past ten years. Other states are required by law to review and/or update their plans on a more regular basis. Ohio is required to review its plan every three years; Arkansas’ plan requires annual review. New Jersey is in the midst of the public review process for updating its plan, which requires updates every two years. Pennsylvania updates its plan every two years.

In its last plan, DSWA established overall policy objectives and goals for solid waste management. The goals were wide-ranging and directed the Authority to achieve an aggressive set of benchmarks. Among them were goals for recycling and material recovery and development of a system for achieving those goals, including:

- Recycle and reuse 35% of household solid waste through materials markets by 2001
- Recover resources, including energy from at least 50% of combustible solid waste by 2001
- Recover resources, including energy from at least 70% of combustible solid waste by 2010

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<sup>11</sup> Delaware General Assembly Joint Sunset Committee, *Joint Sunset Committee 2004 Final Report*, June 10, 2004

- Plan a statewide system with potential for growth to meet the adopted goals for recycling and resource recovery
- Maintain a fifteen year reserve for Statewide landfilling capacity

Some of the Plan's key objectives directed the Authority to:

- Assess new technology through research and development, and incorporate the findings into new and existing projects
- Incorporate flexibility into the SSWMP to adjust to future changes in waste characteristics
- Identify special wastes generated in the State, evaluate current management practices, and recommend courses of action

The 1994 Plan also specifically identifies *landfill avoidance* as the primary goal for waste management.<sup>12</sup> This goal and those above were to be used, in conjunction with projections for solid waste generation, to guide the Authority's planning decisions. Although the projections for MSW generation were remarkably close to actual values, some of the Plan's stated goals were not met, due both to Authority decisions and to factors beyond its control. For instance, DSWA's ability to meet the goals outlined in the Plan has been influenced by legislative and judicial decisions, such as the *Carbone* case, which ended state regulatory flow control, and the passage of Delaware's SB 280, which in effect bans incineration within state borders. While the Authority definitely had to adapt to these changing market conditions to remain viable, it chose to resist until recently publicly driven efforts to develop curbside recycling. DSWA's success in meeting the stated goals should be considered within the context in which the goals were originally established, as well as in light of industry and regulatory changes that have occurred since 1994.

### 1) *Resource Recovery*

In stressing landfill avoidance, the 1994 SSWMP placed a heavy emphasis on waste-to-energy (WTE) as a preferred waste handling method. At the time the SSWMP was released, DSWA was still producing refuse-derived fuel (RDF) from MSW at the Delaware Reclamation Plant (DRP) in New Castle. Originally intended for the adjacent Energy Generating Facility (EGF), a 600 ton-per-day WTE facility that was shut down in 1990, the RDF was sent to a WTE facility in Chester, Pennsylvania until the ultimate closure of the DRP. These events did not deter the Authority from continuing to promote the consideration of WTE as a primary source of waste management.<sup>13</sup>

The reasons for this from the Waste Authority's perspective are clear. Combusting MSW in a waste-to-energy incinerator promotes the dual benefits of reducing the volume of waste requiring disposal (by 90 percent), therefore extending landfill life, and producing energy as a useful byproduct. However, it is not without controversy as was demonstrated with the passage of Senate Bill 280 in 2000. Public opposition to incinerators, which led to the bill, makes siting of a waste-to-energy facility in the state extremely difficult. Despite this strong policy statement by the General Assembly on the siting of facilities within the State, the use of out-of-state facilities is not barred and could be used as the

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<sup>12</sup> DSWA, *Statewide Solid Waste Management Plan (SSWMP)*, Adopted May 1994, p.64

<sup>13</sup> Ibid

DSWA did throughout the 1990s, when it sent shipments of MSW to the Chester facility in quantities up to 1,000 tons per day. More discussion of WTE follows further in this report.

## **2)     *Recycling***

While DSWA has not been able to utilize WTE in-state to meet its resource recovery goals, a certain degree of landfill avoidance is still attainable through recycling. DSWA established the Recycle Delaware program as a voluntary drop-off program for residential recycling. However, Recycle Delaware currently produces only a 4% residential recycling rate. While the Authority has been extremely successful in developing innovative and nationally-recognized recycling programs for certain materials, such as oil filters, electronic goods and junk mail, the Recycle Delaware program has fallen severely short of the SSWMP's stated goal of recycling and reusing 35% of household MSW. In May 2003 DSWA launched a subscription recycling service that currently serves approximately 5000 households in New Castle County. However, numerous parties are now calling for legislatively-mandated recycling programs in order to raise the residential MSW and overall MSW recycling rates. The Recycling Public Advisory Council's proposed mandatory curbside recycling program and Governor Minner's proposed voluntary recycling program are discussed in detail in later sections.

## **3)     *Landfill Capacity***

Since 1994, the Authority has been able to meet its goal of maintaining a 15-year reserve of landfill capacity *statewide* (although the SSWMP only contains solid waste projections for ten more years, through 2015). Based on DSWA's current fill estimates (which do not include increases in annual waste generation), statewide capacity is approximately 17 years.<sup>14</sup> However, in New Castle County, landfill reserve seems to have run up against the reality of shrinking capacity, a lack of new sites and rapid growth in southern portions of the county. Cherry Island Landfill (See Figure 2), which in FY 2004 accepted approximately 64 percent of the state's MSW, has less than 5 years of capacity remaining at currently permitted height restrictions. The expected life of the landfill was originally much longer. However, ongoing monitoring indicated higher than planned pore pressure readings and a reduction in the factor of safety that required the Authority to change its filling patterns and utilize setbacks to increase the landfill's stability. Consequently, these changes shortened the available life.

Much has happened in the area of MSW management both nationally and in Delaware in the last decade. Besides the closure of the DRP and the passage of SB 280, DSWA has had to face the end of state-regulated flow control and rapid growth in some areas of the state. This has placed additional pressures on landfill capacity at Cherry Island and spurred plans for expansion. The Authority is generally regarded as having managed its responsibilities and changing circumstances well. However, the Statewide Solid Waste Management Plan serves as a policy document where results can be measured, current conditions assessed and new objectives set in the context of transparent and robust public discourse. All of these points underscore the need for an updated Plan that reflects current conditions.

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<sup>14</sup> DSWA, *FY2004 Closure and Post Closure Care Cost Estimate Memorandum*, July 23, 2004

## **2. Environmental Regulation of MSW**

The Department of Natural Resources and Environmental Control's role in the state's solid waste management system is to ensure that solid wastes are handled in a manner that protects human health and the environment. DNREC's Solid and Hazardous Waste Management Branch (SHWMB) is responsible for all permitting, inspection and regulatory activities for the generation, disposal, transportation and recycling of solid and hazardous waste in Delaware. This includes:

- All landfill permitting, inspection and enforcement;
- All transfer station, resource recovery and transportation permitting, inspection and enforcement;
- All solid waste regulations and program development;
- Waste material beneficial reuse;
- Recycling and composting facility approvals;
- Waste tire management; and,
- Bottle bill regulations and administration.

With regard to recycling, DNREC conducts various outreach activities to increase public awareness of recycling opportunities. It also supports the Recycling Public Advisory Council through administrative support, by providing research funding, and by offering technical assistance for recycling Grant Assistance Program grant applicants and recipients.

One of several Memorandums of Understanding (MOUs) between DSWA and DNREC formalizes quarterly meetings between the agencies to address issues of mutual interest, including policy concerns and DSWA projects.<sup>15</sup>

In 1994, DNREC also participated in the planning sessions conducted by DSWA to identify goals and objectives for the Statewide Solid Waste Management Plan. While DNREC staff has the opportunity to comment on DSWA's planning approach as part of the public hearing process, the extent of the Department's involvement in any future update of the SSWMP remains unclear.

## **3. MSW Collection**

### **a. Waste Hauling**

While the types of MSW may not vary significantly from household to household throughout Delaware, the way it is collected once it is generated differs significantly throughout the state. In incorporated areas in New Castle County, municipal crews serve 87 percent of households, including Newark and Wilmington (with the exception of 5,000

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<sup>15</sup> Delaware General Assembly Joint Sunset Committee, *Joint Sunset Committee 2004 Final Report*, June 10, 2004



households in large apartment buildings in Wilmington under private contract).<sup>16</sup> Thirteen percent of households are served through municipal contracts with a private hauler, such as those in place in Delaware City and Middletown. Unincorporated areas account for 74 percent of households in New Castle County, only five percent of which self-haul their trash. The remaining 95 percent utilize subscription service with one of at least 10 private hauling companies.<sup>17</sup> Ninety percent of the subscription service market is held by Waste Management, Inc. and BFI, with Independent Disposal Services holding approximately five percent of the market.<sup>18</sup>

In Sussex County, a higher percentage of residents self-haul their waste to collection stations or landfills (16%). Five municipalities provide municipal pickups with their own crews (4%). The remaining 80 percent of residents receive curbside collection service provided by private haulers, whether through subscriptions service or paid for by their municipality. Approximately 11 private haulers offer curbside service in Sussex County.

Kent County differs from the other two counties in that the county is divided into 87 collection districts which are then awarded on the basis of a competitive bid process. Currently, BFI holds the contract which lasts for a period of three years, with one-year options. The districts cover over 8,650 households, or roughly 17 percent of Kent county residents, with the remainder having municipal pick-up (19%), using private haulers (55%) or self-hauling (9%). Approximately 11 private haulers operate in Kent County.

In addition to municipal solid waste hauling, a small amount of recyclables collection is occurring in pockets throughout the state. A handful of municipalities use their own crews to collect some degree of recyclables (Camden, Delaware City, Wilmington) and/or yard waste (e.g. Newark) to be used for mulching. Starting in May 2003, DSWA began offering a subscription-based service for curbside collection of recyclables in parts of New Castle County, expanding to the whole county in September 2004 and to Kent County in September 2005.

#### **b. Licensing**

There are 32 private and 14 municipal waste haulers licensed by DSWA. All solid waste collectors that deliver solid waste to DSWA facilities are required to possess a license issued by DSWA, but do not pay a fee for the license. Waste haulers are also required to obtain a Solid Waste Transporters Permit from the Department of Natural Resources and Environmental Control (DNREC) in order to legally transport solid waste in the state. Transporters pay an annual permit fee of \$300.

#### **c. Tipping Fees**

Once MSW has been collected, the majority of it is delivered to one of three operating landfills in the state. Until 1992, DSWA charged a different tipping fee at each of the county landfills. In 1992 the system changed to a Statewide User Fee System in which all landfills charge the same tipping fee. In June 2005, the tipping fee for municipal solid waste at all of the facilities rose to \$61.50 per ton, up from the \$58.50 per ton price that

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<sup>16</sup> DSM Environmental Services, Inc., *Evaluation of Enhanced Residential Waste and Recyclables Collection and Processing for New Castle County*, October 15, 2003

<sup>17</sup> Ibid

<sup>18</sup> Ibid

had remained constant for eleven years. Special wastes have higher tipping fees, such as tires (\$145.00 per ton) and asbestos (\$100.00 per ton plus \$100 per truckload). Self-hauling residents pay \$1.00 per bag at collection stations.

**d. Differential Disposal Fee Program (DDFP)**

Prior to 1994, state and local governments could dictate that the municipal solid waste generated within their borders be directed to local waste disposal facilities. In 1994, this practice, known as flow control, was outlawed by the U.S. Supreme Court's decision in *Carbone (v Clarkstown, New York)*, thereby threatening the financial commitments local governments and waste agencies had made in municipal solid waste management systems. In 1999, DSWA responded to this ruling by instituting the Differential Disposal Fee Program (DDFP) as a way of keeping waste coming to its landfills and ensuring more predictable waste flow (and fees) to its facilities. Those haulers that enter into a five-year, exclusive contract with DSWA to bring all of their solid waste collected in Delaware to its facilities receive an annual rebate based on the tonnage delivered. The rebate is \$13.50 per ton at the Cherry Island Landfill and \$10.00 per ton at the Sandtown Landfill, Jones Crossroads Landfill and Pine Tree Corners Transfer Station. Between July 2003 and June 2004, all but three of the licensed haulers in Delaware participated in the DDFP. A new five-year contract began on July 1, 2005 at which time the "at the gate" tipping fee for municipal solid waste increased to \$61.50 per ton, while the rebate amounts remained the same. In addition, DDF customers pay only \$42.00 per ton for dry waste at the Sandtown and Jones Crossroads landfills.

**4. Waste Disposal into State Landfills – The Heart of the Issue**

The majority of Delaware's municipal solid waste has historically been managed through landfilling. Throughout the 1990s, DSWA shipped between 500 and 1,000 tons per day of MSW to a waste-to-energy facility in Chester, Pennsylvania, averaging almost 210,000 tons annually. However, this practice stopped in 1999 and DSWA now manages Delaware's municipal solid waste exclusively through landfilling and some recycling programs. Delaware landfills do not accept waste that is generated outside the state (Title 7 Del. Code §6428 expressly prohibits the deposit of waste generated out-of-state in facilities owned and/or operated by the Authority; however, as a public instrumentality, DSWA could request the state law changed).

The DSWA owns and manages four landfills in Delaware, three of which are active. DSWA closed the fourth, Pigeon Point Landfill, in 1985, but continues to manage the site's post-closure care activities. DSWA also operates five collection stations in Kent and Sussex Counties, as well as a transfer station and an intermediate processing facility for recycling in New Castle County. Each of the operations is described in the following sections.

**a. Landfills**

**1) *Southern Solid Waste Management Center (SSWMC)***

The Southern Solid Waste Management Center (SSWMC) opened in September 1984 and is located in Sussex County at Jones Crossroads, approximately 7 miles west of Millsboro.

The complex is 572 acres in size, with 200 acres devoted to landfilling and 372 acres used for buffers areas, weighing and maintenance facilities, and other purposes.<sup>19</sup> The Southern Landfill (also known as Jones Crossroads Landfill or Rt. 20 Landfill) is constructed entirely aboveground due to the high water table in the area. Leachate produced in the landfill is either recirculated back into the landfill or transported to Cherry Island Landfill and pumped to the City of Wilmington's Waste Water Treatment Plant (WWTP) for treatment. A landfill gas collection system that captures and flares off landfill gases collected approximately 30.4 million cubic yards of landfill gas in FY 2004.

On average, the landfill accepts approximately 724 tons of MSW per day (based on 312 operating days per year). In FY 2004, the facility landfilled 225,800 tons of solid waste.<sup>20</sup> DSWA estimates that the current active landfill cell will fill in 2014. The entire landfill is expected to provide capacity for an additional 28 years.

## **2) *Central Solid Waste Management Center (CSWMC)***

The Central Solid Waste Management Center is located in Sandtown, Kent County, approximately 13 miles southwest of Dover. Opened in October 1980, the site encompasses 771 acres. Leachate at the site is managed by recirculation through the landfill or by treatment at Wilmington's WWTP. A landfill gas collection system captures and flares off landfill gases at a single location. In FY 2004, the gas collection system collected and flared 23.8 million cubic yards of landfill gas.

On average, the CSWMC handles approximately 419 tons of solid waste per day. The facility landfilled 130,700 tons of solid waste in FY 2004. DSWA estimates that the current active landfill cell will fill in 2016. The entire landfill is expected to provide capacity for at least 50 years.

## **3) *Cherry Island Landfill***

The Cherry Island Landfill (CIL), also known as NSWMC-2, is one of two landfills that comprise the Northern Solid Waste Management Center. The other, the former Pigeon Point Landfill (NSWMC-1), is closed and is addressed in the next section.

The Cherry Island Landfill (CIL) occupies 238 acres on a 513-acre site in the southeastern part of the City of Wilmington, east of I-495 and south of 12<sup>th</sup> Street. The CIL is bounded on the east by the Delaware River, on the south by the Christina River, and on the north by the City of Wilmington's Wastewater Treatment Plant settling ponds. The facility, which opened in September 1985 with the closure of the Pigeon Point Landfill, received an average of approximately 2,046 tons of MSW per day and landfilled more than 638,200 tons in FY 2004.<sup>21</sup>

### **a) *Current Landfill Design and Capacity***

The Cherry Island Landfill's design differs markedly from the other two active MSW landfills in the state, which were constructed on solid ground with synthetic liners.

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<sup>19</sup> DSWA, *SSWMP*, p. 32

<sup>20</sup> DSWA, *DSWA 2004 Annual Report*

<sup>21</sup> *Ibid*

The CIL is situated atop a former Army Corps of Engineers dredged material disposal site. Since the dredged materials were hydraulically deposited and fine-grained, their consolidation through drainage occurs very slowly over time.<sup>22</sup> However, the landfill designers determined that the naturally slow drainage process could be hastened if waste was placed in the landfill according to a specific design scheme and schedule. This process would also have the effect of consolidating the dredged material below.<sup>23</sup> Because of its low permeability, DNREC deemed the 40-to-60 feet of dredged materials thick enough and with an appropriate hydraulic conductivity to qualify as a natural liner. Except on the side slopes of one perimeter berm which is lined with a geosynthetic clay liner, the landfill's liner system consists of the natural dredged materials liner.

When originally designed, the landfill was expected to have disposal capacity until approximately 2017. However, several factors have shortened the expected lifespan. First, as noted earlier, Delawareans are generating more waste at a faster rate than was predicted when the landfill was opened. Second, as will be described below, the Authority was forced in 1999 to make changes to CIL's fill plan, which decreased remaining capacity.

DSWA has installed in and around the landfill approximately 300 geotechnical instruments (including inclinometers, piezometers, total pressure cells, settlement plates and thermistors) that record indicators of landfill stability. In 1999, some monitors began indicating higher than planned readings of pore pressure (pressure of water in the void spaces in the underlying soils). The same year, Schnabel Engineering Associates evaluated the landfill's stability for DSWA and determined that "enhancements were needed to allow continued waste disposal."<sup>24</sup> At that time, DSWA altered its plan for placement of waste in the landfill in order to preserve its integrity and maintain safety. That move also had the consequence of decreasing the available disposal volume. Currently, the CIL is expected to reach capacity by the end of 2009 without significant improvements. DSWA has submitted an application to vertically expand the landfill, with the most recent revision calling for a final height of 195 feet. The expansion, described in more detail in following sections, was expected to extend the life of CIL by approximately 20 years, based on a projected annual average disposal quantity of 1,000,000 cubic yards per year.<sup>25</sup> DSWA now estimates a more conservative additional capacity of 15 years based on increasing MSW generation rates.

In addition, adjacent land called Wilmington Harbor North, which is owned by DSWA but is currently being used by the Army Corps of Engineers for disposal of dredged material from Wilmington Harbor, was expected to be available as early as 2004. DSWA now expects the parcel to be available in 2010<sup>26</sup> based on an agreement reached with the Corps in 2002; however, there seems to be some disagreement with the Corps on the nature of the agreement and handover date, with the Corps claiming a later date due to lower shoaling rates which makes for more capacity than envisioned when the 2002 agreement was reached.

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<sup>22</sup> DSWA, *SSWMP*, p. 29

<sup>23</sup> Discussion with Pasquale Canzano, DSWA

<sup>24</sup> GeoSyntec Consultants, *Application for Solid Waste Permit Modification (Cherry Island Landfill Expansion Project)*, Volume 7, p. VIb-2, June 2004

<sup>25</sup> *Ibid*, p. VIb-80

<sup>26</sup> DSWA, *DSWA 2003 Annual Report*

As will be discussed further in the report, because of a shortage of readily available capacity for dredge material disposal, proposals have been made that would delay handover by approximately five years beyond 2009. DSWA estimates that WHN could provide an additional 13.5 million tons of disposal capacity.<sup>27</sup> Once the Authority regains control of the parcel, they expect to take two to three years to dewater and consolidate the dredged material and further prepare the site to accept solid waste.

b) *Leachate and Landfill Gas*

Management of the landfill is not limited to determining the placement of solid waste within the structure. It also includes managing leachate, which is created by liquids, primarily precipitation, percolating through the landfill, and managing landfill gases, such as methane and hydrogen sulfide, that are created as wastes decompose.

*Leachate Collection System*

Precipitation that falls on the landfill percolates through the structure and mixes with other liquids present in the waste. Collectively, this is known as leachate and may contain contaminants such as ammonia, heavy metals or suspended solids, depending on the composition of the waste handled. The CIL was designed with an extensive leachate collection system, which captures the leachate and pumps it to the City of Wilmington Wastewater Treatment Plant. The system also removes some of the water present in the underlying dredged material layer and conveys it to the treatment plant as well. In FY 2004, 90.3 million gallons of leachate and pore water from the unconsolidated soils in the underlying dredge layer from CIL was collected and treated.

The collection system includes 47 sampling points to monitor production, as well as the quality of groundwater and surface water in the vicinity of the site. Some controversy exists over the degree to which potential leachate losses may have impacted underlying aquifers. The Columbia Aquifer, directly beneath the site, is known to be contaminated, due both to brackish water and to historic industrial land use in the region. However, the deeper lying Potomac Aquifer, which is not known to be contaminated, represents the principal water supply aquifer in northern New Castle County. As such, the DNREC Water Resources staff is currently working with DSWA to develop a plan to more precisely determine the direction and rate of local and regional groundwater flow and to identify additional monitoring wells downgradient of the site. DSWA reports that results of its groundwater analysis indicate landfilling operations have not impacted groundwater quality at the CIL.<sup>28</sup>

*Landfill Gas Collection System*

Under U.S. EPA regulations, large municipal solid waste landfills are required to operate landfill gas collection and treatment systems. This is due to the fact that the natural decomposition of solid waste in landfills produces numerous, potentially harmful air emissions, including: methane gas, which contributes to global warming; volatile organic compounds, which contribute to smog; hydrogen sulfide and other air pollutants. U.S.

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<sup>27</sup> Ibid

<sup>28</sup> DSWA, *DSWA 2003 Annual Report*, p.26

EPA estimates that the CIL produces more than 100 tons of methane gas and more than 50 tons of non-methane organic compounds per year.<sup>29</sup>

In 1990, DSWA installed the initial landfill gas collection system at the CIL with 50 gas collection wells and candle flares. In July 1995, DSWA contracted for the construction of a landfill gas processing plant to remove water from and compress the gas, which is then transported via pipeline to Delmarva Power's Edgemoor power plant where it is converted into electricity. The landfill gas management system is owned and operated by Cereza Energy, Inc., under contract to DSWA. Cereza is responsible for the design, installation and operation of the system.

In recent years Cereza and DSWA have been at odds over the operation of the gas collection system. Cereza officials admit that that previous forecasts of landfill gas production seriously underestimated the amount of gas produced, which exceeded projections by 20 to 25 percent.<sup>30</sup> It is estimated that the approximately 28.7 million cubic yards collected in FY 2002<sup>31</sup> represents only about half the gas believed to have been produced inside the landfill.<sup>32</sup> DSWA contends that piping and other equipment was undersized and therefore could not adequately collect and transport the gas. Clogged equipment and monitoring and maintenance problems, for which DSWA was cited in March 2004, also prevented adequate gas collection and may have contributed to unpleasant odors in the I-495 corridor.

In response, throughout 2002 and 2003 Cereza added nearly 120 new gas wells and more than five miles of additional piping and other equipment upgrades, including a larger back-up flare and a larger compressor. In addition, the facility made use of a passive flare system to burn off excess gas and reduce odors. The site also received a permit for two 3,000 ft<sup>3</sup>/min open flares for use at times when gas delivery to Delmarva Power is curtailed or prevented (DSWA has applied to replace these with two low-NO<sub>x</sub> closed flares). Since these upgrades, DSWA estimates that the landfill gas collection system now processes approximately 10.8 million cubic feet of landfill gas per day.<sup>33</sup>

#### *Landfill Gas Violations and Enforcement*

Between March 1 and October 27, 2003, DNREC cited DSWA for odorous emissions incidents on six separate occasions. As a result, DNREC fined DSWA for violating State air and solid waste regulations and proposed corrective action including:

- improvements to the landfill gas transmission lines, compressor capacity and soil cover;
- implementation of monitoring and surveying; and,
- use of odor neutralizers and/or masking agents.<sup>34</sup>

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<sup>29</sup> U.S. EPA, Region 3, *Press Release: EPA and Delaware Enforce Clean Air Act Standards at Cherry Island Landfill*, March 2, 2004

<sup>30</sup> The News Journal, *Committee extends probe of solid waste authority*, June 5, 2004

<sup>31</sup> DSWA, *DSWA 2002 Annual Report*, p. 25

<sup>32</sup> Ibid

<sup>33</sup> DSWA responses to questions, December 10, 2004

<sup>34</sup> Ibid

In May 2004, the Authority submitted applications for a horizontal gas extraction system and a temporary geomembrane cover which are designed to reduce landfill gas emissions and odors. DNREC issued permits for these two enhancements in February 2005.

c) *Applications to Expand and Improve CIL*

As recently as 1999, DSWA predicted the CIL would be accepting wastes as late as 2015.<sup>35</sup> However, due to factors discussed previously such as accelerated filling and the uneven settling, it now appears available capacity will be exhausted by the end of 2009. Recognition of this fact prompted DSWA to examine options for future waste disposal.

*Expansion Alternative Selection*

Around 2000, DSWA began investigating alternatives to handle waste disposal into the future. The options examined, which are presented in the table below,<sup>36</sup> included various combinations of:

- Residential and commercial recycling, including construction of a materials recovery facility (MRF),
- Exporting waste to out-of-state waste-to-energy (WTE) facilities
- “Ash-for-trash” arrangements where an out-of-state WTE facility would accept DSWA’s MSW in exchange for residual ash disposal in a DSWA facility,
- Construction of a landfill at a new site,
- Transfer MSW to DSWA landfills downstate, and
- Vertical expansion of Cherry Island Landfill to 290 feet

After performing detailed cost-benefit analyses of the various options, DSWA selected vertical expansion of the CIL (Option #9 below) citing advantages which included existing infrastructure, already completed siting, low environmental impact and long-term solid waste disposal until at least 2037. Gaining use of the adjacent dredged material disposal property currently employed by the Army Corps of Engineers could add an additional 13.5 million tons of solid waste disposal capacity to the site as a whole (equivalent to 15 to 20 years of capacity at current disposal rates).<sup>37</sup>

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<sup>35</sup> The News Journal, *Plans to expand landfill opposed*, March 17, 2003

<sup>36</sup> From DSWA Cherry Island Landfill Public Workshop PowerPoint presentation, [www.dswa.com](http://www.dswa.com)

<sup>37</sup> DSWA, *DSWA 2003 Annual Report*, p. 37

**Table 2**  
**Future Waste Disposal Options Considered by DSWA**

Option #	Option Description	Capital Costs	Operational Costs & Revenues	Impact on Landfill Life	Annual Amount to Landfill
1	MRF Only (recycle 87,400 TPY)	\$8.2 M	MRF Costs: \$7M/yr MRF Rev.: \$2.9M/yr	6 years MRF operation = 1 year gained at CIL	437,600 TPY
2	MRF (recycle 87,400 TPY), CIL Vertical Expansion	\$74.2 M	Costs: \$7M/yr Revenues: \$2.9M/yr	Gain approx. 20 years at CIL beyond 2006 (plus Corps site could add 24 more years)	437,600 TPY
3	MRF (recycle 87,400 TPY), out-of-state WTE (280,600 TPY)	\$8.2 M	WTE - \$40/ton MRF Costs - \$7M/yr MRF Rev. - \$2.9M/yr	Every 1 year of operation gains 2 years at CIL (until 2025)	157,000 TPY
4	Out-of-state WTE (368,000 TPY), "ash-for-trash" (184,000 TPY)	None	WTE: \$12/ton	Extend CIL capacity to 2012	341,000 TPY
5	Out-of-state WTE (368,000 TPY), Landfill	None	WTE: \$40/ton	Extend CIL capacity to 2025	157,000 TPY
6	New landfill site	\$109 M	N/A	Use CIL until new landfill available with 27-year life	525,000 TPY to new landfill
7	Transfer waste to other DSWA landfills	\$36 M for new transfer station, new cells at CSWMC	N/A	Exhausts capacity at CSWMC in 17 years versus current 62 year capacity	525,000 TPY to CSWMC landfill
8	Residential and commercial MRFs (recycle 81,200 TPY), landfill residuals	\$7 M/MRF	Costs: \$8.7 M/MRF Rev.: \$4.6 M/MRF	Extend CIL capacity to 2010	443,800 TPY
9	CIL Vertical Expansion	\$66 M	N/A	Provide disposal until 2037 (Plus 24 more years from Corps site)	525,000 TPY

Source: Cherry Island Landfill Public Workshop PowerPoint presentation

Some have argued that DSWA used unrealistically high capital cost estimates (\$8.2 million) and annual operating cost estimates (\$7 million per year) and low annual revenue estimates (\$2.9 million) for the Materials Recovery Facility (MRF), thus skewing the alternative selection in favor of landfill expansion. In a study for the Recycling Public Advisory Council, DSM Environmental Services, Inc. estimated that DSWA could construct the necessary single-stream processing capacity (at the existing Intermediate Processing Facility at Pigeon Point) for much less - between \$3.9 and \$4.7 million.<sup>38</sup> DSM also estimated annual operating and maintenance costs to run approximately \$3.0 million

<sup>38</sup> DSM Environmental Services, Inc., *Evaluation of Enhanced Residential Waste and Recyclables Collection and Processing for New Castle County*, October 15, 2003, p. 31-32.



per year<sup>39</sup> and annual revenue to run approximately \$4.8 million.<sup>40</sup> Under these conditions, MRF operations would be expected to nearly break even, showing a small loss or profit depending on how recyclables' values fluctuate in the market.

### *Landfill Expansion Applications*

In April 2003, DSWA submitted to DNREC an application for a \$66 million expansion and repair project which would increase the height of CIL from its currently permitted limit of 172 feet to 288 feet. The expansion project would “slightly increase the permitted area, but would [sic] dramatically increase capacity by steepening the side slopes and adding height to the landfill.”<sup>41</sup> Since the original application, DSWA has submitted two revisions, in September 2003 and June 2004. The current expansion application requests a smaller increase in the landfill's height to 195 feet. The vertical expansion is designed to both improve overall stability of the landfill, as well as provide additional solid waste disposal capacity. With the expansion, the projected life expectancy of the CIL would be approximately 20 years based on an available volume of 20,700,000 cubic yards (including waste, daily cover and immediate cover soils).<sup>42</sup> DNREC is currently reviewing the application for expansion.

To expand capacity at the CIL, the DSWA plan calls for construction of a mechanically stabilized earth (MSE) wall and stabilizing berm along three sides the landfill, including those facing the Delaware and Christina Rivers.<sup>43</sup> The 60-foot vertical walls would be constructed of earthen materials and reinforced with a plastic grid which allows the walls to achieve a steeper than normal slope, and hence greater height and volume in (almost) the same footprint. Additionally, by placing overburden pressure on the subsoils, the MSE wall helps to consolidate them, increasing their strength and stability.<sup>44</sup>

As will be discussed further in the report, disposal of the City of Wilmington's WWTP sludge also contributes to the shortage of landfill capacity in general. Currently, VFL mixes the City's sludge with fly ash from the nearby Delmarva Power plant and several out-of-state power plants to create stabilized sludge that could be used in limited construction projects. Proposals have been developed for using this material in construction applications in CIL expansion plans.

The subsurface and perimeter improvements to the CIL also include the installation of prefabricated vertical drains (PVDs) or wick drains, which are intended to strengthen the landfill foundation by accelerating the release of liquids within subsoils at the perimeter of the landfill. The drains are designed to transmit water flow up and down a polypropylene core, while preventing infiltration of fine particles from adjacent soils.<sup>45</sup> The PVDs would be inserted through the subsoils into the Columbia Formation where they would “act as

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<sup>39</sup> Derived from Table 9, *ibid*

<sup>40</sup> Recycling Public Advisory Council, MOA Report Summary: Statewide Curbside Recycling Program, January 4, 2005, p.14.

<sup>41</sup> DSWA, *Cherry Island Landfill Expansion Project brochure*

<sup>42</sup> GeoSyntec Consultants, *Application for Solid Waste Permit Modification (Cherry Island Landfill Expansion Project), Volume 7: Design Report*, June 2004, p. VIb-80

<sup>43</sup> DSWA, *DSWA 2002 Annual Report*, p.8

<sup>44</sup> DSWA, *Cherry Island Landfill Expansion Project brochure*

<sup>45</sup> *Ibid*

straws drawing water both to the surface for removal and to the Columbia Formation below, depending on the amount of excess pressure” of liquids within the soils.<sup>46</sup> By alleviating hydraulic pressure, the wick drains should further enhance stability.<sup>47</sup>

DSWA has argued that without the expansion, it may be forced to ship wastes to downstate landfills (or to out-of-state facilities), which could potentially drive up disposal costs. DNREC is currently reviewing the expansion application.

d) *Citizen Concerns and Complaints*

Since DSWA’s initial announcement that it was seeking to expand the CIL, citizen opposition has been vocal and organized. Concerns range from environmental issues (air quality, groundwater and surface water contamination) to quality of life issues (odor, noise, truck traffic and declining property values).

*Odor*

In the summer of 2002, DNREC began fielding increased citizen complaints about odors in the Edgemoor area of New Castle County. Residents from east Wilmington to southern Brandywine Hundred have complained about odors in the I-495 corridor that some say are so strong they “can wake [one] from a dead sleep”.<sup>48</sup>

While one single source of the odors has not been identified, the CIL has most likely contributed to the problem to some degree. It is speculated that the same factors that have led to increased methane production in the landfill – such as accelerated filling and precipitation infiltration – could also be responsible for an increase in odorous, non-methane gases.

In response to the complaints, DSWA has taken several steps to identify and address the sources of odors. As discussed previously, Cereza has made improvements to the landfill gas collection system including the addition of gas extraction wells, a larger pipeline, more miles of pipeline, a larger compressor and the use of back-up flares. DSWA also participated in the Edgemoor Odor Roundtable and sponsored its own odor studies.

Since April 2003, DSWA has participated in DNREC’s Edgemoor Odor Roundtable, which has studied the odor issues along the I-495 corridor. Participating industries, such as Delmarva Power, the City of Wilmington’s Wastewater Treatment Plant, VFL, IKO, DRPI Landfill and DuPont Edgemoor, reviewed their operations to identify potential sources of odors and possible remedies. During Phase I of the study, DNREC hired a consultant to “fingerprint” each facility’s emissions to determine, if possible, a unique chemical signature for each one.<sup>49</sup> Phase II attempted to match the fingerprints to samples collected during reported odor events. While the study did identify some matches, including some for the CIL, most odor events had multiple sources. The Roundtable is looking at several monitoring and data analysis enhancements for a possible follow-up study.

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<sup>46</sup> Ibid

<sup>47</sup> DSWA, *DSWA 2002 Annual Report*, p.8

<sup>48</sup> The News Journal, *Scientist targets source of stench*, June 5, 2003

<sup>49</sup> Edgemoor Odor Roundtable, *Edgemoor Odor Roundtable Fact Sheet*, [www.dnrec.state.de.us/dnrec2000/divisions/awm/aqm/odors/pdf/odorfactsheetsround.pdf](http://www.dnrec.state.de.us/dnrec2000/divisions/awm/aqm/odors/pdf/odorfactsheetsround.pdf)

Potential sources of odors at CIL were examined in three additional studies prepared for DSWA, two by Entrix, Inc. and one by the University of Delaware. The University of Delaware study evaluated the nature of odors from the stabilized sewage sludge product (sewage sludge mixed with fly ash) produced by VFL, Inc. and which had been used as a cover material at CIL (and is now used in recontouring the Pigeon Point Landfill). The study, which measured odorants in sewage sludge alone, fly ash alone and the stabilized sewage sludge product, suggested that the sludge is the source of the odors and that fly ash does not mitigate those odors.<sup>50</sup>

The initial Entrix study attempted to model potential migration of odors from landfill gas and stabilized sewage sludge to populated areas.<sup>51</sup> A follow-up study performed revised landfill gas modeling using gas generation rates after improvements to the landfill's gas collection system. The studies determined that landfill gas odors (measured in H<sub>2</sub>S) could be detected at or above 10 ppb in residential areas, particularly those west and northwest of the landfill. Prior to the gas collection system upgrades, H<sub>2</sub>S may have been detected in a 13-mile radius around the landfill, with 2-to-4 mile wide extensions projecting up to 37 miles away. Post-upgrades, the modeling demonstrated significant decreases in the odor radius (to 6 miles) and the width (1-to-2 miles) and length (up to 17.5 miles) of plume extensions.<sup>52</sup>

While Entrix determined that the stabilized sludge could produce off-site odors, it concluded that these would likely be insignificant relative to those created by the city's Wastewater Treatment Plant adjacent to the CIL. However, Entrix noted that the potential for volatilization could be further reduced by implementing stabilized sludge management practices such as mixing the material with soil and minimizing disturbances once the material is placed.<sup>53</sup>

### *Quality of Life*

Residents living close to the landfill have expressed concerns that the expansion will exacerbate existing odor, noise and air quality problems, making economic revitalization even more difficult in already blighted neighborhoods. This raises issues of environmental justice where historically poor communities composed of minority populations with little political clout have had undesirable industrial and public works facilities located in their midst. In this instance, public health and quality of life are perceived as threatened by truck traffic, noise, dust, and the looming presence of the landfill that already stands at approximately 100 feet.

Residents who live near the landfill feel the expansion will guarantee they will have to bear the brunt of the hazards and nuisances for decades to come, while residents in other parts of the county are spared these impacts. Some argue that another waste disposal option should be located closer to the source of the waste, whether it be above the C&D canal where according to DSWA, more than 70 percent of the waste in New Castle County is

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<sup>50</sup> University of Delaware, *Odor Source Characterization at the Cherry Island Landfill in Wilmington, Delaware (Project 1)*, July 2003

<sup>51</sup> Entrix, Inc., *Air Quality Assessment - Cherry Island Landfill*, June 2003

<sup>52</sup> Entrix, Inc., *Air Quality Assessment: Amendment - Cherry Island Landfill*, March 2004

<sup>53</sup> Entrix, Inc., *Air Quality Assessment - Cherry Island Landfill*, June 2003, p. 4-6.

currently generated, or below the canal, where much of the county's new growth is occurring (and hence future waste generation).

Stephanie Bolden is a resident of and the Councilwoman for the City of Wilmington's Third District, which includes the Cherry Island Landfill. She opposes expanding the landfill for all of the reasons described above, in particular the visual blight and odor issues. She has worked with activist groups to mobilize local residents against the expansion. About increasing the landfill's permitted height she says, "My residents won't support it. I won't support it."

#### *Groundwater*

In addition to odor, regulators and citizens have expressed concerns over the potential for groundwater contamination beneath the landfill. Responding to the Authority's plan to utilize wick drains to dewater the subsoils beneath the CIL, DNREC in October 2003 called for construction of new groundwater monitoring wells to clarify "uncertainties about pollution risks" at the landfill.<sup>54</sup> DNREC is concerned that the use of wick drains in earlier projects at the site in the mid-1990s may have been responsible for the presence in a well adjacent to the Christina River of elevated levels of ammonia and iron, both potential indicators of leaking landfills.<sup>55</sup> DNREC is also concerned that their use in this project could result in contamination entering the Colombia Aquifer (which is already contaminated and not a drinking water source) and passing into the deeper Potomac Aquifer, which is the primary drinking water supply aquifer in northern New Castle County. DNREC's Division of Water Resources is currently working with DSWA to develop a plan to more precisely determine the direction and rate of local and regional groundwater flow and to identify additional monitoring wells downgradient of the site.

#### *Other concerns*

Some residents and environmental groups oppose the expansion because they feel the DSWA has not put enough effort into developing effective waste reduction and recycling programs that would reduce the amount of waste generated and needing disposal. A 2002 Franklin Associates report estimates that while Delawareans generate about 25 percent more municipal solid waste per capita than the rest of the nation,<sup>56</sup> they recycle it at less than half the national average of 28 percent.<sup>57</sup>

DSWA is also in litigation with the landfill gas contractor, Cereza Energy, Inc. from whom it wishes to take control of the gas collection system. DSWA feels that Cereza's collection system was undersized, a factor that is responsible for methane releases and odor problems at the landfill.

#### **4) Pigeon Point Landfill**

The former Pigeon Point Landfill is located on Lambson's Lane in New Castle, southeast of the City of Wilmington. The majority of the site is owned by the City of Wilmington,

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<sup>54</sup> The News Journal, *Landfill pollution risks face scrutiny*, November 5, 2003

<sup>55</sup> Ibid

<sup>56</sup> Franklin Associates, Ltd., *Assessment of Delaware Solid Waste Discards in 2000 and the Potential for Recycling of Materials*, 2002, p. 1-12

<sup>57</sup> The News Journal, *Neighbors criticize landfill expansion*, June 1, 2003

with small portions held by the Delaware River and Bay Authority and DSWA. The City of Wilmington began operating the landfill in 1971, then ceded management to New Castle County in the late 1970s. The County ran the landfill until 1981, when DSWA took over operations. DSWA accepted wastes there until October 1985 when it closed the landfill under Delaware's Solid Waste Regulations and began post-closure monitoring and maintenance activities. Between 1971 and 1985, approximately six million tons of waste was disposed of there. The total thickness of the solid waste deposits ranges from 40 to 60 feet.<sup>58</sup>

Currently, the capped surface of the landfill encompasses approximately 120 acres. Due to differential settlement of the material within, the top of the landfill is topographically irregular.<sup>59</sup> Beginning in 1995, stabilized sludge material was used on a limited basis to fill in depressions in the landfill surface in order to maintain topology. Eventually, a more formal cap enhancement plan was developed to recontour the landfill surface to promote drainage and reduce leachate production. The plan includes gradually placing fill material across the surface of the landfill, working from south to north, and creating an approximately 5 percent slope from the center of the landfill to the edges to allow rainwater to runoff.<sup>60</sup> Work on the plan began in January 2003.

Under the regrading plan, stabilized sludge was to be utilized at Pigeon Point at a rate of 150,000 tons per year over nine to ten years.<sup>61</sup> However, the actual placement rate over the past year has been more than double the original target. Between September 2004 and August 2005, stabilized sludge was placed at the site at an average rate of almost 30,200 tons per month, or more than 362,000 tons per year. This higher rate of placement occurred largely because DSWA stopped utilizing stabilized sludge as daily cover at Cherry Island Landfill due to the fact that the material's consistency inhibited vehicle traffic on the landfill and to citizen complaints about odors. If placement continues at this rate, the regrading will be complete within two to three years and another use will have to be found for the stabilized sludge. If, due to a lack of other options, the City is forced to landfill its sludge, it will have to pay the "at the gate" per ton tipping fee, which would cost the City almost \$3.7 million annually based on current sludge generation rates and tipping fees.

*A more detailed discussion of sludge and its impact on landfill capacity occurs later in the report.*

## **b. Collection Stations and Transfer Stations**

### **1) Collection Stations**

DSWA currently operates five collection stations throughout Delaware. Four are located in Sussex County (Bridgeville, Ellendale, Long Neck, Omar) and one is located in Kent County (Cheswold). The stations provide a means of drop-off waste disposal for residents of rural areas where subscription service is not offered. The charge is \$1 per bag (up to 33 gallons). Users can further reduce the amount they pay by utilizing the Recycle Delaware

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<sup>58</sup> [www.dswa.com](http://www.dswa.com)

<sup>59</sup> Duffield Associates, *Conceptual Evaluation: Partnering Opportunities for the City of Wilmington*, June 2004, p. 5

<sup>60</sup> Ibid

<sup>61</sup> Ibid

Center available at the collection station. Approximately only ten percent of the state's population self-hauls its trash.

## **2) *Transfer Stations***

- **Pine Tree Corners Transfer Station** - Opened in April 1991, it is located three miles south of Odessa on Road 25 West. The site occupies 81.5 acres and provides residents and commercial haulers with an alternative to bringing their trash to the Cherry Island Landfill. On average, 224 tons per day of MSW are delivered to Pine Tree Corners, compacted, loaded and then transported via transport truck to the CIL in northern New Castle County. The facility is permitted to receive an average of 350 tons per day, with peaks up to 550 tons per day.
- **Pigeon Point Transfer Station** - Located in New Castle, DSWA's Delaware Recycling Center is home to both the Intermediate Processing Facility (IPF) and the Pigeon Point Transfer Station (PPTS). At the IPF, recyclables collected under the Recycle Delaware program are cleaned and further sorted (depending on the end-use), and then shipped to markets. Residual non-recyclable materials are moved through the PPTS and transferred to CIL. The PPTS is permitted to handle up to 2,000 tons per day of recyclables and MSW.
- **Future Transfer Stations** - DSWA has recently begun construction activities for two new transfer stations to open in 2005 in Kent and Sussex Counties. A third transfer station, to be located in Dover, is in the planning stages. All of the projects are intended to improve service and reduce labor and fuel costs associated with waste transportation. The Milford Transfer Station, slated to open in December 2005 or January 2006, is permitted to accept up to 350 tons per day and 30,000 tons per year of MSW. A Resort Transfer Station, designed to respond to the rapid development occurring in eastern Sussex County, will be located near Millsboro on Route 5. That facility may accept up to 500 tons per day of MSW.

## **3) *The Delaware Recycling Center (DRC)***

The Delaware Recycling Center (DRC) is located on Lambson's Lane in New Castle. The DRC receives and processes materials collected through the Recycle Delaware program, as well as from commercial establishments and municipalities that operate recycling programs for their own local residents and customers. At the Intermediate Processing Facility (IPF), the materials are further sorted, cleaned of contaminants, and baled if needed. Processed materials are then transported to available markets to be recycled into new products.

Also part of the DRC, the Pigeon Point Transfer Station (PPTS) handles recyclables and recycling residuals and is permitted to receive up to 2,000 tons of recyclables and MSW daily.

The DRC also processes used oil filters collected through the Oil Filter Recycling Program and accepts electronic goods from Delaware schools, residents and businesses under the

Electronic Goods Recycling Program. Both of these programs are described in more detail in the following section.

## **5. Recycling**

The benefits of recycling are numerous and well known. Manufacturing products from recycled materials decreases consumption of raw materials, saves energy, reduces environmental damage from industrial, commercial and residential wastes, and lowers greenhouse gas emissions. Of course, most pertinent to this discussion is the fact that recycling saves landfill space.

Delaware's recycling rate for residential solid waste is only four percent. The commercial sector recycles significantly more, bringing overall municipal solid waste recycling rate to approximately 22 percent. However, this is still below the national average of 28 percent and that of surrounding states – Virginia (29 percent), New Jersey (38 percent), Maryland (29 percent) and Pennsylvania (27 percent).<sup>62</sup> This is due to the fact that Delaware's primary residential recycling program, Recycle Delaware, is a voluntary, drop-off program that is used by only 20 to 30 percent of residents.<sup>63</sup>

A few curbside recycling programs operate sporadically throughout the state. Some municipal programs such as Camden and Delaware City have received grant monies through DNREC to start municipal collection of recyclables. Wilmington collects recyclables in some areas of the city although the program does not generate much volume. In May 2003, DSWA launched its own voluntary curbside recycling program which now serves residents of New Castle County and Kent County; as of September 2005, it included approximately 5,000 households.

With the submission of the Cherry Island Landfill expansion application, recycling once again came into the spotlight, with both residents and lawmakers calling for curbside recycling programs. With the goal of increasing the residential recycling rate to 30 percent, in January 2005 the Recycling Public Advisory Council (RPAC) presented draft legislation mandating statewide residential curbside recycling. While that legislation failed to gain sponsorship in the Legislature, it did provide a foundation for Governor Minner's own recycling legislation. In her 2005 State of the State address the Governor said, "Increasing recycling in Delaware is an idea whose time has come and, if put off, may not come again. It is the right and responsible thing to do and I ask those with an open mind to help me propose the most responsible way to do it."<sup>64</sup> Her residential curbside recycling legislation was introduced at the end of the 2005 legislative session and found co-sponsorship from nearly two dozen members as Senate Bill 225.

Both the RPAC legislation and Senate Bill 225 are discussed in detail below, along with other current MSW recycling efforts in the state.

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<sup>62</sup> BioCycle, *The State of Garbage in America*, January 2004

<sup>63</sup> Recycling Public Advisory Council, *MOA Report Summary: Statewide Residential Curbside Recycling Program*, January 4, 2005, p. 6.

<sup>64</sup> Governor Ruth Ann Minner, *Delaware State of the State Address*, January 25, 2005

## a. Recycle Delaware

In 1990, DSWA launched the Recycle Delaware (RD) program, a statewide voluntary program that allows residents to bring their separated recyclables to any of approximately 145 drop-off centers throughout the state. The RD centers are generally located within a 5-mile radius of most residential areas and consist of specially-marked containers into which residents deposit materials. Most RD centers accept newspapers, junk mail, plastic bottles, cans, glass, corrugated cardboard, household batteries and plastic grocery bags. Some RD centers also accept motor oil, used oil filters, and textiles. A DSWA-hired contractor collects the materials from the RD centers and transports them to DSWA's Intermediate Processing Facility at the Delaware Recycling Center in New Castle. There, the materials are further separated, sorted, baled and shipped to recycling markets. The program generates an average of 1,500 tons of recyclable material every month<sup>65</sup> and approximately 96 percent of the materials collected through the Recycle Delaware program are sent to markets to be recycled. In FY 2004, approximately 20,102 tons of recyclables were received at RD centers.<sup>66</sup>

The Recycle Delaware program is recognized as one of the most successful and comprehensive drop-off recycling programs in the country. However, a recent report estimated that only 20 to 30 percent of New Castle County households use the Recycle Delaware program on a regular basis.<sup>67</sup> As such, only 14 percent of potentially available recyclables from NCC households are being recycled, resulting in a countywide recycling rate of six percent of RSW.<sup>68</sup> Statewide, the residential recycling rate is estimated to be only four percent of the MSW.

DSWA points out that while the agency made approximately \$1.1 million from the sale of recyclable materials in FY 2003, its collection and processing costs exceeded \$4.3 million, for a net loss of over \$3.2 million. However, according to research conducted under the Recycling Public Advisory Council discussed in later sections, a MRF managing single stream recyclables could operate at a profit in excess of \$1 million annually.

DSWA's other recycling programs include a residential curbside recycling program (discussed in the next section), as well as:

- ***Electronic Goods Recycling*** – In FY 2003 and FY 2004, DSWA annually collected over two million pounds of used electronics, including computers, televisions, telephones and audio equipment from Delaware residents, schools and business. This is more than the combined total collected for Virginia, West Virginia, Pennsylvania and Maryland.<sup>69</sup> More than 85% of the materials collected through the EGR program were recycled or reused.
- ***Used Motor Oil Recovery*** – Used motor oil deposited at Recycle Delaware centers is collected (through a subcontractor) by Delaware City-based Valero (formerly

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<sup>65</sup> DSWA, *Working With You to Protect Delaware's Quality of Life* brochure

<sup>66</sup> DSWA, *DSWA 2004 Annual Report*

<sup>67</sup> DSM Environmental Services, Inc., *Evaluation of Enhanced Residential Waste and Recyclables Collection and Processing for New Castle County*, October 15, 2003

<sup>68</sup> Ibid

<sup>69</sup> Recycling Public Advisory Council, *Fourth Annual Report*, January 2005



Premcor) and is reprocessed. In FY 2004, 1,397 tons of used motor oil was recycled through the program.<sup>70</sup>

- ***Oil Filter Recycling*** – DSWA’s oil filter program was the first statewide oil filter program in the country. DSWA collects over 1.2 million of the approximately 1.4 million oil filters sold annually in Delaware from over 485 service stations and other businesses and over 60 Recycle Delaware centers throughout the state. The filters are processed through an Oil Filter Kruncher, a machine that crushes up to 10 filters at a time, extracts residual oil, and compresses the filters into ten-pound steel briquettes. These are sold to CitiSteel USA, Inc. in Claymont which mixes them with other steel for recycling.<sup>71</sup> Ninety-nine percent of the residual oil in the filters is collected and sent to Valero for re-refining. DSWA processed 496 tons of used oil filters in FY 2004.
- ***USPS Junk Mail*** – DSWA works with over 12 United States Postal Service offices to divert Undeliverable Bulk Business Mail (UBBM), or “junk mail”, from the MSW stream. In FY 2004, DSWA recycled 1,041 tons of junk mail through this program.
- ***Construction and Demolition (C&D) Waste Recovery*** - In FY 2002, DSWA began a construction and demolition (C&D) waste recovery program. The Authority collects the material at its landfills and ships it to a Baltimore or Philadelphia company that processes the construction waste by recovering wood, aggregates, and metals and removing other unwanted debris prior to shredding and screening. The processed material is then returned to DSWA and used as daily cover material (as Recover Mat or Barrier) or on roadways throughout its landfills in place of stone.<sup>72</sup> DSWA recovered and reused more than 68,000 tons of C&D materials in FY 2004.

#### **b. DSWA’s Curbside Recycling Program**

In May 2003, DSWA launched a pilot curbside recycling program for residents of Brandywine Hundred and expanded the service to all households in New Castle County in September 2004. The program was further expanded to Kent County in September 2005. For \$6 per month, the program offers weekly pick-up of separated recyclables in a DSWA-provided blue bin and material-specific bags. DSWA charges an additional \$3 per month for weekly collection of up to 4 bags of yard waste, including grass clippings, leaves and brush less than two inches in diameter. DSWA has also initiated a pilot program with the City of Dover to determine the existence of economic and/or technical efficiencies associated with serving high population density areas. The curbside recycling service will be offered there at a reduced rate of \$4 per month, with intent of enrolling at least 500 families. DSWA is discussing initiating a similar pilot program with the City of New Castle.

DSWA uses specially outfitted recycling trucks to collect the recyclables, which include corrugated cardboard, plastic bottles, steel and aluminum cans, glass, junk mail, newspapers and magazines. Collected materials are processed at the DSWA’s Intermediate Processing Facility (IPF) where they are further sorted if necessary and then shipped to recycling markets. Yard waste is transported to the Cherry Island Landfill

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<sup>70</sup> Ibid

<sup>71</sup> DSWA, DSWA Oil Filter Recycling Program brochure

<sup>72</sup> DSWA, *DSWA 2002 Annual Report*, p. 12

where it is chipped and shredded. It is then offered free to residents or used on the landfill as alternate daily cover.

As an additional incentive to enroll in the program, DSWA created “Partners In Recycling”. Under this initiative, eight of the private trash haulers in New Castle County offer discounts to residents who sign up for DSWA's Curbside Recycling program. Discounts vary from \$1.00 to \$2.00 to 10% off of the cost of monthly trash pick-up.

As of September 2005, approximately 5,000 of the 200,000 households in New Castle County, or 2.5 percent, were enrolled in the curbside recycling program. It is worth noting that a study completed for DSWA by DSM Environmental Services, Inc. indicated that the voluntary subscription curbside program alone is not capable of achieving a 30 percent RSW diversion goal.<sup>73</sup>

#### **c. Recycling Assistance Grant Program**

DNREC's Solid and Hazardous Waste Management Branch administers a grant program known as the Recycling Assistance Grant Program (RAGP) which aims to foster community-based programs to expand RSW recycling efforts. Using criteria developed by the Recycling Public Advisory Council, DNREC selects from among eligible applicants, such as municipalities, educational institutions, non-profits, and community organizations, to receive a portion of each year's matching grant funding. Examples of eligible projects include development of recycling and yard waste composting programs, recyclables curbside collection, design of “Pay-As-You-Throw” programs, or other projects aimed at reducing RSW generation and/or disposal.<sup>74</sup> Grant recipients must provide 25% of total project funding in cash or an equivalent valuation of in-kind services. In FY 2004 and 2005, nearly \$50,000 in state money was awarded annually in matching grant funds. \$174,000 was allocated between FY 2001 and FY 2003.

While the RAGP has had some success in promoting small scale projects, the size of the funds is not adequate to fund start-up of programs in the larger municipalities where the most impact can be made. In its 2000 report “A Course of Action to Increase Recycling in the State of Delaware,” the Citizens Work Group on Recycling recommended annual grant funding of \$500,000 per year to raise the RSW diversion rate to 25 percent. In each of its annual reports, the Recycling Public Advisory Council has also recommended increasing grant funding (up to \$150,000 by 2005) in order for RAGP to have any meaningful impact on recycling. It has also suggested that the RAGP's effectiveness has been hampered by the lack of a Materials Recovery Facility (MRF) to process commingled recyclables from curbside collection.

#### **d. Recycling Public Advisory Council (RPAC) and Curbside Recycling**

In September 2000, then Governor Thomas R. Carper signed Executive Order No. 82 which established a goal of a 30 percent diversion rate for recyclables from Delaware's residential solid waste stream and created the Recycling Public Advisory Council (RPAC) to investigate means to achieve that goal. Under Governor Ruth Ann Minner, RPAC has

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<sup>73</sup> DSM Environmental Services, Inc., *Estimated Statewide Residential Recycling Rates*, November 2004

<sup>74</sup> DNREC, RAGP literature

continued to pursue ways to increase residential recycling and the Governor again endorsed the 30 percent recycling goal for RSW in her 2005 State of the State address.

The Council is a nine-member body comprised of a cross-section of interests throughout the state including: one member each from DNREC, DSWA and the Delaware Economic Development Office (DEDO); one member each from the recycling industry and the waste hauling industry; one member representing county governments; one member representing municipal governments; and two members representing environmental or citizens' groups.

RPAC was charged with advising DNREC and DSWA on all aspects of recycling, including designing a methodology for measuring recycling rates and developing possible outreach activities to achieve the 30 percent goal. Since 2000, RPAC has studied a variety of potential methods to increase the capture rate for recyclables in the residential portion of the waste stream. During that same period, public and legislative interest in recycling increased, particularly in light of the proposed CIL expansion, and culminated in several pieces of proposed legislation that urged exploring curbside recycling options.

Spurred by these efforts and civic awareness, on January 6, 2004, RPAC, DNREC and DSWA entered into a Memorandum of Agreement (MOA) in order to evaluate the feasibility of and costs associated with implementing a statewide mandatory curbside recycling program in Delaware. Throughout 2004, the Council met numerous times to quantify recyclables, to assess costs, collection systems and funding mechanisms, and ultimately to develop draft legislation to require mandatory curbside recycling.

### ***1) Objectives and Tasks of the MOA***

RPAC, DNREC and DSWA were charged with recommending a method for collecting and processing recyclables statewide (including yard waste), recommending funding mechanisms for such a system, and drafting legislation to implement the recommendations.<sup>75</sup> In order to develop their recommendations the MOA parties completed a number of tasks, including:

- Assess the statewide composition of the residential solid waste stream
- Identify and quantify those materials that can be removed through source separation and curbside collection
- Study mandatory curbside recycling programs in practice nationwide for use in developing potential models for Delaware
- Estimate costs and revenues of a mandatory curbside recycling program and identify potential funding sources

### ***2) RSW Recyclables and Yard Waste Characterization***

In 2003, working on behalf of RPAC, DSM Environmental Services, Inc. (DSM) used the data in a 2002 report by Franklin Associates on recycling to develop recyclable material categories and estimate residential collection values for New Castle County. Under the MOA, this information was extrapolated to residential solid waste in Kent and Sussex counties using 2000 U.S. Census data to create a statewide picture of potential recyclables. That profile is presented in Table 3.

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<sup>75</sup> RPAC, *Draft MOA Report Summary*, November 2004

Table 3 <sup>76</sup> RSW Estimated Annual Recyclables Generation by County (in Tons*)				
Materials Considered Curbside Recyclable	Generation			
	Statewide	New Castle	Kent	Sussex
<b>PAPER</b>				
<b>ONP: News, Magazines, Phone Books</b>	<b>34,210</b>	<b>21,894</b>	<b>5,474</b>	<b>6,842</b>
<b>Junk Mail</b>				
Office Papers	3,050	1,952	488	610
Third Class Mail	9,950	6,368	1,592	1,990
Other Commercial Printing	11,700	7,488	1,872	2,340
<b>Total Junk Mail</b>	<b>24,700</b>	<b>15,808</b>	<b>3,952</b>	<b>4,940</b>
<b>Cardboard</b>	<b>9,800</b>	<b>6,272</b>	<b>1,568</b>	<b>1,960</b>
Boxboard				
Folding Cartons	9,360	5,990	1,498	1,872
Other Paperboard Packaging	350	224	56	70
Bags and Sacks	4,230	2,707	677	846
<b>Total Boxboard</b>	<b>13,940</b>	<b>8,922</b>	<b>2,230</b>	<b>2,788</b>
<b>TOTAL PAPER</b>	<b>82,650</b>	<b>52,896</b>	<b>13,224</b>	<b>16,530</b>
<b>BOTTLES AND CANS</b>				
Glass Bottles	21,580	13,811	3,453	4,316
Steel Cans	6,460	4,134	1,034	1,292
Aluminum Cans and Foils	3,235	2,070	518	647
Plastic Bottles: PET	3,974	2,543	636	795
Plastic Bottles: HDPE	4,017	2,571	643	803
<b>TOTAL BOTTLES AND CANS</b>	<b>39,266</b>	<b>25,130</b>	<b>6,283</b>	<b>7,853</b>
<b>Total, All Recyclables</b>	<b>121,916</b>	<b>78,026</b>	<b>19,507</b>	<b>24,383</b>
<i>Percent of Available Recyclables</i>	<i>100%</i>	<i>64%</i>	<i>16%</i>	<i>20%</i>
<i>Percent of Total Residential Solid Waste</i>	<i>24%</i>	<i>15%</i>	<i>4%</i>	<i>5%</i>
<i>Percent of Total RSW, at 65% capture</i>	<i>15.6%</i>	<i>9.8%</i>	<i>2.6%</i>	<i>3.3%</i>
<b>Total, All Recyclables, Less Glass</b>	<b>100,336</b>	<b>64,215</b>	<b>16,054</b>	<b>20,067</b>
<i>Percent of Total Residential Solid Waste</i>	<i>19.7%</i>	<i>12.6%</i>	<i>3.1%</i>	<i>3.9%</i>
<i>Percent of Total RSW, at 65% capture</i>	<i>12.75%</i>	<i>8.2%</i>	<i>2.0%</i>	<i>2.55%</i>

\*Based on data collected for the year 2000

The data indicate that if 100 percent of all curbside recyclable materials were collected, a RSW recycling rate of 24 percent (121,916 tons) would be achieved. However, RPAC recommended excluding glass from the mandatory recycling program because of the material's several drawbacks: broken glass contaminates other recyclables, increases wear and tear on equipment, and increases processing costs; and, recycled glass has a low recycling market value. Therefore, with glass removed from the available total, potential recyclables drop to 100,336 tons. In addition, curbside collection programs typically only capture 65 percent of the materials available. A 65 percent capture rate would therefore equate to an overall RSW recycling rate of only 12.75 percent. This is 3.5 times more

<sup>76</sup> Based on Table II from RPAC's *MOA Report Summary: Statewide Residential Curbside Recycling Program*, January 2005

materials than are currently collected through the Recycle Delaware drop-off system, but far off the 30 percent recycling goal for RSW.<sup>77</sup>

In order to reach the 30 percent goal, RPAC determined that yard waste, which comprises approximately 23 percent of the RSW stream, would also have to be diverted from the state's landfills. DSM, which completed a yard waste study for RPAC, estimated that 45,200 tons of yard wastes are currently diverted from RSW disposal through municipal collections of leaves, brush and other trimmings, and through DSWA's mulching of yard waste materials that arrive at its facilities. However, DSM estimated that banning yard waste from the state's landfills will further reduce the amount of RSW disposed by over 58,100 tons annually.<sup>78</sup> As such, RPAC recommended that DNREC adopt a similar strategy to that of many states in the region and ban yard waste from Delaware's landfills. (Alternatively, DSWA could impose its own yard waste ban.) The following table, prepared by DSM, illustrates the projected impact of such a ban on the residential solid waste stream and MSW stream as a whole.

Table 4 <sup>79</sup>				
Annual Delaware Yard Waste Recycling (In Tons)				
Disposition of Yard Waste	Total		Residential (90 % of Total)	
	Pre Yard Waste Ban	Post Yard Waste Ban	Pre Yard Waste Ban	Post Yard Waste Ban
Yard Waste mixed w/ MSW & Disposed In DSWA Landfills	95,600	31,000	86,040	27,900
New offsite Yard Waste recycling	0	45,200	0	<b>40,680</b>
New onsite Yard Waste recycling*	0	19,400	0	<b>17,460</b>
Yard Waste diverted, mulched and used at DSWA Landfills	4,500	4,500	4,050	4,050
Yard Waste diverted through Municipal and Private mulching	45,724	45,724	41,152	41,152
Total Yard Waste Generated	145,824	145,824	131,242	131,242
<i>Total Yard Waste recycled</i>	<i>50,224</i>	<i>114,824</i>	<b><i>45,202</i></b>	<b><i>103,342</i></b>
% of Yard Waste recycled	34%	79%	34%	79%
* Onsite recycling includes homeowner/business use of mulching mowers and on-site composting.				

### 3) *Mandatory Curbside Recycling Model*

After examining several recycling systems in practice in other states, in the fall of 2004 RPAC devised a mandatory recycling model to integrate with Delaware's unique collection system. The model has the following features:

- ***Single-stream collection of recyclables*** – Residents would be required to separate recyclables from trash but would not be required to sort them before

<sup>77</sup> RPAC, *MOA Report Summary: Statewide Residential Curbside Recycling Program*, January 4, 2005

<sup>78</sup> Ibid

<sup>79</sup> DSM Environmental Services, Inc., *Yard Waste Ban Report*, September 15, 2004

placing them out for collection. Table 3 above identifies all of the materials (excluding glass) that would be collected curbside in one container.

- ***Establishment of a MRF*** – DSWA would build and manage a Materials Recovery Facility (MRF) at Pigeon Point for sorting, processing and marketing the recyclables collected statewide. There would be no tipping fee at the MRF. At the anticipated 65% capture rate and using current market values, recyclables revenues are expected to be approximately \$4.8 million, which should cover the costs of MRF operations. Losses would be covered by a dedicated fund (see below).
- ***“Privatization” of collection*** - This model is similar to the current trash collection system in which municipalities, private homeowners and existing districts would be responsible for contracting with private haulers (or municipal crews) for curbside collection of recyclables, as well as responsible for the cost of that collection. Haulers would be required to provide their customers with curbside recycling service, either directly or through contract with a recycling collection company. If private collectors could not provide the service, DSWA would collect using its subscription service.
- ***Self-hauling provisions*** – Self-haulers, while not required to obtain subscription service, would still be required to separate recyclables from trash (as a single-stream) and deposit them at drop-off centers at DSWA landfills and transfer stations.
- ***Elimination of the Recycle Delaware*** drop-off program. From the outset of discussions on mandatory curbside recycling, DSWA stated that if a mandatory program were legislated, all Recycle Delaware Centers would be removed, as the program would no longer be necessary. DSWA would maintain drop-off recycling facilities at the landfills and some transfer facilities to accommodate self-haulers only.
- ***Phase-In*** of counties, with service implemented in New Castle County first, and expanding to Kent and Sussex Counties one year later.

RPAC members felt that the privatization model would cause the least disruption in the current collection system for homeowners, municipalities and counties, private haulers and state agencies, and would allow for a maximum of private sector involvement, as required under Title 7, Chapter 64. The single-stream nature of the system was designed to maximize capture rates with relatively low collection costs and a high degree of convenience for the homeowner.

a) *Costs*

Even though the establishment of a MRF will improve the sale of recyclables from their current levels (higher volume, better prices), revenues would not be enough to cover the costs of collection and processing. Therefore, the costs of collection would be assumed by the homeowner, either through subscription service with private haulers or through municipal fees. DSM estimated that the monthly cost of collection would range from approximately \$3.00 to \$7.00 per household, depending on several factors, including whether recyclables are picked up concurrently with trash or on separate days.

*b) Funding*

In order to cover start-up costs, particularly for equipment, RPAC recommended establishing a \$5 million reserve from the State of Delaware General Fund to be made available in the form of grants to the municipalities. The funds would be authorized as a one-time appropriation and would be phased out over a period of time (probably 2008), with the intent that the municipalities' programs would become self-sustaining.<sup>80</sup>

RPAC also recommended establishing a dedicated fund to offset DSWA's operating costs for the MRF when those costs exceed the revenue from the sale of recyclables. The fund would also cover the costs of education, research and program enforcement. The fund would be financed through a waste-end assessment on all privately collected solid waste in Delaware, excluding hazardous waste, on a per-ton basis, which is not expected to exceed \$3 per ton.

*4) Mandatory Yard Waste Diversion*

As stated previously, RPAC recommended banning yard waste from disposal facilities in the state. It is anticipated that 30 percent of the diverted yard waste would be managed at the point of origin, through grasscycling (i.e., using mulching mowers and leaving grass clippings in place), composting, and mulching.<sup>81</sup> The remaining yard waste would be collected curbside by the residents' existing private hauler or municipal crew, at an expected cost of \$3 to \$5 per month. RPAC recommended that this material be managed through several low- or intermediate technology composting facilities to be constructed throughout the state, and operated either by the private sector or by DSWA if no private operators choose to participate. Operation of these composting or yard waste recycling facilities would be funded through tipping fees.

While generally garnering support from industry and the public alike, the proposed ban on yard waste has generated numerous questions regarding who would handle the yard waste, as well as how and where would it be processed. Questions were raised over land requirements and siting, economic impacts on affected groups, odor and other environmental issues, and timing of the ban. These concerns were still unresolved in June 2005 when Governor Minner proposed her own recycling legislation (discussed in Section II.B.5.e), which also calls for a landfill ban on yard waste. In the summer of 2005, DNREC formed the Yard Waste Management Committee to help address the many uncertainties associated with the ban. Comprised of a cross-section of stakeholders (public and private; regulatory, industry, and municipal), the Committee's objectives are to:

- Review, revise and develop a plan for the management of yard waste in Delaware
- Develop guidelines for yard waste mulching and composting facilities
- Identify private sector interest in yard waste mulching and composting
- Identify markets for mulch and compost.

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<sup>80</sup> RPAC, *MOA Report Summary: Statewide Residential Curbside Recycling Program*, January 4, 2005

<sup>81</sup> Ibid

Subcommittees are meeting independently to address the issues specific to each element of a yard waste program: Separation/collection/transportation; Processing; Marketing/Business Model; and Education. The Yard Waste Management Committee aims to have a draft plan for statewide yard waste management by Christmas 2005.

#### **5) *Landfill Life Expectancy and Net Impact of Mandatory Recycling***

As stated previously, Cherry Island Landfill in New Castle County will soon reach its fill limit, due in part to design limitations. Under current conditions and at an average current fill rate of 2,046 tons per day, capacity will be reached by the end of 2009. (DSWA's planned expansion of CIL would add approximately 12 million tons capacity; an additional 13.5 million tons capacity would become available with the acquisition of the adjacent Army Corps of Engineers property.) There is no near-term landfill capacity shortage in Kent or Sussex Counties, and the Sandtown Landfill in Kent County has approximately 55 years of capacity at current fill rates, without assuming further growth in annual waste generation.

RPAC estimated that achieving a 30% RSW recycling rate would result in an 18% reduction in total tonnage of materials landfilled (assuming RSW is 60% of total MSW;  $30\% \times 60\% = 18\%$ ). The following table (Table 5), wherein the authors of this report have revised "Table I" from RPAC's Memorandum of Agreement Report Summary ("RPAC MOA Report"), shows the anticipated landfill impacts from diverting 30% of RSW through curbside recycling and a yard waste ban, as well as from diverting 40% of MSW as a whole. Table 5 differs from the MOA Report Table I in that the "Annual Landfilled Tons" have been updated to reflect actual 2004 tonnages (CIL – 638,000 TPY; Sandtown – 131,000 TPY; Jones Crossroads – 226,000 TPY). Furthermore, Table 5 presents different landfill life expectancies than Table I. This is due both to the higher 2004 tonnages and to the fact that the 2004 tonnages already exceed the predicted annual tonnages (CIL – 635,000 TPY; Sandtown – 125,000 TPY; Jones Crossroads – 225,000 TPY)<sup>82</sup> which DSWA used in calculating the individual landfill life expectancies.<sup>83</sup>

The landfill life expectancy calculations have assumed constant values for annual waste generation. However, annual waste generation has grown historically (albeit inconsistently) and can be expected to do so in the future. Therefore, the actual landfill life expectancies will probably be shorter than those predicted below. For example, the life expectancy shown below for CIL assuming expansion is permitted (19.9 years) would be reduced by approximately 2 years if corresponding waste generation were to grow at a rate of 1% per year, or would be reduced by approximately 5 years if waste generation were to grow at a rate of 3% per year.

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<sup>82</sup> DSWA, *FY 2004 Closure and Post Closure Care Cost Estimate* memorandum, July 23, 2004

<sup>83</sup> DSWA, *DSWA 2004 Annual Report, 2004 Financial Report, Note 6*



Table 5 <sup>84</sup>				
Landfill Impacts From 30 % RSW and 40 % MSW Recycling Rates				
	Cherry Island	Sandtown	Jones Crossroads	Statewide
Annual Landfilled Tons (2004)	638,000	131,000	226,000	995,000
RSW Portion of Landfilled Tons @ 60 %	382,800	78,600	135,600	597,000
Tons RSW Recycled @ 30 %	114,840	23,580	40,680	179,100
Net Annual Landfilled Tons	523,160	107,420	185,320	815,900
Net Total Recycled	18 %	18 %	18 %	18 %
Current Design Life Expectancy in Years – With CIL Best Case Scenario (2009)	5.0	55.3	27.9	16.8
Design Life Expectancy in Years With 30 % RSW Recycling	6.1	67.5	34.0	20.5
Design Life Expectancy in Years With 40 % MSW Recycling	8.3	92.2	46.5	28.0
Design Life Expectancy in Years with Permitted CIL Expansion	19.9	55.3	27.9	26.4
Design Life Expectancy in Years With CIL Expansion & 30 % RSW Recycling	24.3	67.5	34.0	32.2
Design Life Expectancy in Years With CIL Expansion & 40 % MSW Recycling	33.2	92.2	46.5	44.1

DSM's calculations for RPAC were based on DSWA's application to DNREC for expansion of the CIL.

The table highlights the fact that a long-term solution would not be realized at Cherry Island with mandatory residential recycling and a yard-waste ban *alone*. Over a twenty-year timeframe (which would entail some degree of landfill expansion), recycling and the yard waste ban have a greater impact on CIL capacity, particularly when the recycling goal is increased from 30 percent of residential MSW to 40 percent of total MSW. When this occurs, the landfill life rises from approximately 24.3 years to 33.2 years.

**e. Senate Bill 225 - Governor Minner's Draft Recycling Legislation**

As described above, RPAC's proposed legislation sought to achieve a 30 percent residential recycling goal through mandatory residential curbside recycling and a ban on yard waste in the state's landfills. However, RPAC was not able to find sponsorship for the legislation. Subsequently, Governor Minner's office drafted her own recycling legislation, which garnered co-sponsorship by nearly two dozen legislative members and was introduced to the legislature on June 15, 2005 as Senate Bill 225. The highlights of her proposal include:

- ***Voluntary recycling at the state level*** – Unlike the RPAC legislation, S.B. 225 does not mandate statewide curbside recycling, but instead allows local governments to choose to establish mandatory or voluntary programs.

<sup>84</sup> Format and percentages derived from Table I, Ibid

- ***Recycling franchise districts*** - Unincorporated areas could establish recycling franchise districts (similar to Kent County's trash districts), either through petitions by residents or through the county. The existing trash collection system would remain intact. Franchise districts could create efficiencies in collection and processing, thereby keeping costs lower.
- ***Zero tipping fee for recyclables*** - No tipping fee would be charged for recyclables delivered to the Material Recovery Facility (MRF) or to DSWA transfer facilities.
- ***\$3 per ton assessment fee*** - DNREC would collect a \$3 per ton assessment fee on solid waste collected and/or disposed of in the state (excluding hazardous waste and recyclables actually recycled). The fees would generate an estimated \$3 million annually.
- ***Establishment of a Delaware Recycling Fund*** which would be used to fund specific activities designed to enhance the state's recycling rate. Revenue for the fund would be generated through the \$3 per ton assessment fee described above. The monies collected would be used to:
  - Fund the ***Local Governments Recycling Grants Program***, a competitive program to assist counties and municipalities with the start-up costs of establishing source-separated recyclables collection programs, with an emphasis on single-stream curbside collection. The grant program would begin in 2006 and would be offered annually through 2012.
  - Fund studies to evaluate the potential for recycling the commercial MSW and for improving the curbside recycling program
  - Fund public outreach and education programs to promote curbside recycling, organic yard waste management and the Local Governments Recycling Grants Program.
  - Pay DSWA's capital and operating costs to manage source-separated single-stream recyclables without imposing a tipping fee. (If available funding is insufficient to cover these costs, DSWA could impose a tipping fee to cover the shortfall).
- ***Ban on organic yard waste disposal at landfills*** – The ban would require generators to separate organic yard waste from other solid waste and transporters to deliver yard waste to designated processors, starting January 1, 2007. The bill encourages the development of private processing facilities, with DSWA managing the yard waste if the private operations fail to materialize. DSWA would be permitted to charge a tipping fee at processing facilities in order to cover its operating costs.
- Continuation of the ***Recycling Public Advisory Council***
- ***Establishment of recovery goals*** for residential and commercial municipal solid waste. Recovery goals for RSW would be 20 percent by January 2008, 25 percent by January 2009 and 30 percent by January 2010. The recovery goal for commercial MSW would be 50 percent by January 2010.

The bill was referred to the Senate Natural Resources & Environmental Control Committee on June 29, 2005 and will therefore not be acted on until the next legislative session at the earliest. In the meantime, legislators, RPAC, DNREC, DSWA and other stakeholders will likely debate its pros and cons.

## f. Commercial Recycling

Commercial waste constitutes approximately 40 percent of the MSW generated in Delaware and therefore represents a crucial piece in any plan to raise the state's overall MSW recycling rate and reduce landfill deposits. According to the 2002 Franklin Associates recycling study completed for DSWA, the commercial sector is already recycling materials at a much higher rate than the residential sector – more than 35 percent<sup>85</sup> versus 4 percent through the Recycle Delaware drop-off program.<sup>86</sup> Table 6 shows the quantities of materials commercial entities reported recovering from the MSW stream for FY 2004. It is worth noting that this data is self-reported and not verified, and therefore categories may be over-reported or under-reported. Furthermore, it may include materials that were not generated in Delaware, but were collected by Delaware businesses.

<b>Table 6: Materials Recovered from Delaware Businesses in FY2004<sup>87</sup></b>			
Material Collected	Tons	Material Collected	Tons
All Aluminum	4,703	Polystyrene	266
All Other Non-Ferrous Metals	5,110	Mixed Glass	1,522
Automotive Batteries	1,932	Corrugated Cardboard	1,917
Newspapers	27	Yard Waste	41,414
Plastic Bottles	73	Tires	9,516
Office Paper	2,484	White Goods	10,249
Junk Mail	388	Other (vegetable oil, ink, soil, etc.)	148,389

In addition to the independent commercial recycling described above, recycling of commercial wastes occurs through several DSWA programs. Many commercial establishments and public agencies currently participate in DSWA programs such as those for oil filter recycling and electronic goods recycling.

Other states have implemented mandatory commercial MSW recycling programs that have included requirements for recycling office paper, cardboard, newspapers and beverage containers by government agencies, schools, libraries, and office buildings with 20,000 square feet or more of office space. The feasibility and impact of implementing such programs in Delaware will require more detailed study of the commercial sector to thoroughly understand the composition of the waste stream, the quantities of materials generated and their potential for recycling. DSWA, in cooperation with Parkowski, Guerke & Swayze, P.A., is funding a statewide study of commercial solid waste in order to better understand the potential for beneficial reuse of these materials and the subsequent potential impact on landfill capacity. Beginning in September 2005, the study will be

<sup>85</sup> Franklin Associates, Ltd., *Assessment of Delaware Solid Waste Discards in 2000 and the Potential for Recycling of Materials*, Table 9, p. 2-4.

<sup>86</sup> RPAC, *MOA Report Summary: Statewide Residential Curbside Recycling Program*, January 4, 2005

<sup>87</sup> From *DSWA 2004 Annual Report, 2004 Recycling Report*

conducted by DSM Environmental Services, Inc., the same group that completed the residential recycling study for RPAC. DSM hopes to complete a report by the end of 2005. In addition, Governor Minner's draft legislation, Senate Bill 225, also provides funding for a study to evaluate the status and potential for recycling the commercial component of MSW. As Table 5 suggests, when recycling goals are expanded to include all parts of the municipal solid waste stream, including commercial waste, the impacts on landfill life expectancy can be great.

#### **g. Bottle Bill**

In 1982, the Delaware Legislature passed the Litter Control Act/ Beverage Container Law. Finding that beverage containers were a major source of non-degradable litter in the state, the General Assembly sought to create incentives to their reuse and/or recycling by instituting a refundable deposit system for all non-aluminum beer, ale, malt, carbonated soft drink, mineral and soda water containers less than 2 quarts<sup>88</sup>. (Aluminum cans are not included.) Under the law, stores must charge consumers a five-cent deposit on all of the above-mentioned beverage containers. Upon return of the container to the store, the consumer is to be refunded the five cent deposit.

However, many consumers do not return the containers and hence do not collect the refund. The deposits paid remain the property of the wholesaler or retailer who sold the beverages. Because no official reporting requirement exists, it is unknown precisely how many containers are generated, how much is paid in deposits and how much in deposits go unclaimed. As part of a recycling feasibility assessment it completed for DSWA in 2002, Franklin Associates estimated the quantity of eligible containers to be 93,296,470 and total deposits paid to be \$4,664,820, for the year 2000.<sup>89</sup> It further calculated that the deposits redeemed totaled \$1,774,940, leaving \$2,889,880 unclaimed.

In some states with "bottle bills", such as California and Hawaii, unclaimed deposits are used by the state to support recycling infrastructure and education. Currently, Delaware's legislation does not enable the State to acquire the unclaimed deposits. However, members of the public and others have suggested that the legislation be changed to allow unclaimed funds to be used to support recycling efforts in the state.

### **6. Sunset Review**

During 2004 the DSWA underwent sunset review, a periodic legislative review of state agencies, boards and commissions to determine their public need and effectiveness in meeting that need. Typically, an agency, board or commission is reviewed once every six or seven years. The process is administered by the Delaware General Assembly's Joint Sunset Committee (JSC), a bipartisan ten-member committee comprised of five senators and five representatives. With the help of public hearings that are held during legislative session, the JSC recommends the continuance, consolidation, transfer or termination of an agency, board or commission.

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<sup>88</sup> Delaware Code, Title 7, Chapter 60, Subchapter III. Beverage Containers

<sup>89</sup> Franklin Associates, Ltd., *Assessment of Delaware Solid Waste Discards in 2000 and the Potential for Recycling of Materials*, p. 2-8

In reviewing the DSWA, the Joint Sunset Committee held three public hearings in order to gather additional information and elicit opinions about the DSWA from agency staff, sub-contractors, DNREC representatives and the general public. Public comments ranged from being complimentary of DSWA for being well-run and innovative, to calling for an end to the Authority. Numerous complaints focused on the Cherry Island Landfill, particularly related to odor and other quality of life issues. In addition, many comments expressed the need for mandatory recycling.

On May 31, 2005, the Joint Sunset Committee voted unanimously to again continue its sunset review of the Delaware Solid Waste Authority into 2006. A final report will be issued subsequent to the review's conclusion. The outcome of the Sunset Review could have a substantial impact on the future of the DSWA.

## **C. OPTIONS FOR ADDRESSING LANDFILL CAPACITY LIMITS**

### **1. Update the Statewide Solid Waste Management Plan (SSWMP)**

As stated previously, the SSWMP represents a framework for DSWA to carry out its responsibilities for planning and managing the State's solid waste. However, DSWA has not undertaken a comprehensive update of the Plan for more than ten years, although the Plan has been amended twice in the past five years in order to address changes in regulatory and market conditions. For instance, over the past decade plus, significant regulatory and other changes have occurred (the end of flow control, passage of SB 280, closure of the Delaware Reclamation Plant), as well as changes in the state's population, development and the economy, with consequences for how solid waste is handled in Delaware. DSWA has met its obligations to manage Delaware's solid waste and has responded to changes in the waste management business by adapting the goals set in 1994 to meet new demands as well as new limitations. However, the process of adaptation has largely been without the benefit of considered public review and oversight. A revised and updated plan would provide the public with important tools to discuss and debate the options for managing solid waste in the coming decades. If a revised plan had been available before the application was made to expand Cherry Island, it would have provided the public and policy makers with the means to adequately assess the expansion, as well as options, and the opportunity to contribute to the Authority's decision-making process. Ideally, this would have resulted in more consensus surrounding the final choice and greater public acceptance. The Statewide Solid Waste Management Plan should be revised and updated for public review and comment as soon as possible.

### **2. Expand Cherry Island in accordance with permit application**

The path of least resistance is to move ahead with DSWA's expansion plan, which buys another approximately 15 years of capacity. When combined with the landfill space available when DSWA assumes control of WHN, capacity extends out approximately 35 years. (However, an alternate confined disposal facility or other management option for deposition of dredged material is then required to replace WHN.) In the short term, this may be the most convenient course to take; however, once expansion plans are underway it is difficult for decision makers to reverse course. Currently, there are a few short-term options that offer significant opportunities for waste disposal or landfill avoidance such as sending the waste downstate or out of state to another landfill or WTE facility. However,

these options have not been publicly debated in the context of the landfill expansion application. Decisions of this magnitude require thorough evaluation and public input – another reason the Statewide Solid Waste Management Plan should be revised and updated.

### **3. Ship Waste Out of New Castle County**

In lieu of expanding Cherry Island landfill or in combination with other options, DSWA could consider shipping solid waste out of New Castle County for disposal either in downstate landfills or in out-of-state facilities. With a landfill and transfer stations in each county, Delaware's solid waste does not have to travel very far from the point of generation to the place of disposal. While this would be unusual for Delaware, it tracks trends occurring in other parts of the country. According to Solid Waste Digest, for the United States as a whole, solid waste travels an average of 50 miles from origination to disposition. Distance alone should not eliminate options from consideration, whether they are in-state or out-of-state, but should be included in a comparative analysis of various options and combinations.

#### **a. Ship to Downstate DSWA facilities**

This scenario involves haulers transporting the solid waste collected in New Castle County to either Pigeon Point Transfer Station (PPTS) or Pine Tree Corners Transfer Station (PTCTS) where it would be consolidated and placed into larger trailer trucks and transported to the Sandtown Landfill southwest of Dover. Sandtown Landfill has capacity to serve Kent County for more than 55 years, based on current filling rates. If the approximately 2,046 tons per day that is currently disposed at CIL were transferred to Sandtown, it would shorten that landfill's remaining available life to less than 10 years. If a portion of that amount, for instance waste from southern New Castle County, were sent to Sandtown, the fill rate would be less and the capacity would be extended.

PPTS is permitted to receive up to 2,000 tons per day, which currently includes sorted recyclables and residuals. PTCTS is currently permitted to receive up to 350 tons per day (it can receive up to 550 tons per day under special circumstances such as holiday weekends, but must still maintain the 350 tons per day average over a week). Already, PTCS's daily limit is frequently met and waste haulers are diverted to Sandtown on occasion. Consequently, the downstate transportation scenario would likely entail some or all of the following: utilizing PPTS; increasing the PTCTS daily limit and expanding the facility; and/or building another transfer station in New Castle County to accommodate the volume of solid waste. DSWA estimates that transporting waste from PPTS or Pine Tree Corners Transfer Station to Sandtown landfill would cost between \$25.00 and \$35.00 per ton based on its current contract with Waste Management, Inc. and on past experience.<sup>90</sup> Increases in fuel costs over the last year have not been factored into these estimates.

It may be worth noting that should CIL close, DSWA is currently not obligated to transport MSW from New Castle County to downstate landfills. Under the Differential Disposal Fee (DDF) program, which currently runs from July 1, 2005 through June 30, 2010,

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<sup>90</sup> DSWA responses to questions, December 10, 2004

contracted haulers are obligated to dispose of their waste at a DSWA facility. With a CIL closure, this could be done at PTCTS, Sandtown or Jones Crossroads. However, once the daily limit at PTCTS is met, the haulers would be forced to take their waste to Sandtown landfill or Jones Crossroads landfill. And the Authority would not be required to accept waste at Pigeon Point Transfer Station and pay to transport it, even if the facility has capacity. Faced with the high fuel prices, labor costs and inconvenience of transporting waste to Kent or Sussex Counties, waste haulers would be likely to argue (probably in court) that the original conditions under which they signed the DDF contract had been altered, thereby nullifying the contract and the obligation to take waste to DSWA facilities. Of course, DSWA would be likely to counter (also in court) any such attempt to void the DDF contract.

## **b. Out-of-State MSW Disposal**

Another option for DSWA is to transport waste consolidated at existing (and potentially future) stations to landfills and/or waste-to-energy facilities outside Delaware. Pennsylvania and Virginia continue to be the top two waste importing states in the country. In 2004, Pennsylvania and Virginia imported approximately 10.1 million tons<sup>91</sup> and 7.8 million tons of solid waste respectively.<sup>92</sup> (New Jersey and New York account for more than 90 percent of the solid waste that is imported in Pennsylvania.<sup>93</sup> In Virginia, 42 percent of out-of-state waste comes from Maryland, 24 percent from New York and 16 percent from Washington, DC.)<sup>94</sup> In 2003, the last calendar year for which statewide reporting is available, Maryland was a net exporter of solid waste, importing less than 1,000 tons of MSW. Of the 24 counties in Maryland, 13 counties were either transporting their waste out-of-state or evaluating plans to do so.<sup>95</sup>

Consequently, Pennsylvania and Virginia represent the most likely candidates for out-of-state waste disposal for Delaware. Both have many landfills – (Virginia with 60, Pennsylvania with 49) and each has five waste-to-energy facilities. However, when considering the out-of-state disposal option, several factors merit consideration including available capacity, tipping fees, transportation costs, and some states' attempts at reverse flow control legislation.

### **1) Available Capacity**

Some controversy exists regarding the amount of available waste disposal capacity in Pennsylvania. In 2002, the Pennsylvania Waste Industries Association (PWIA) released a solid waste disposal capacity study estimating that only approximately 7 years of available capacity remained in Pennsylvania. Citing unnecessarily long permitting time frames and “harms/benefits” regulations that have further increased permitting costs, delays and denials, the PWIA predicted that disposal capacity in the eastern half of the state would be

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<sup>91</sup> Pennsylvania Department of Environmental Protection (PADEP) website - <http://www.depweb.state.pa.us/news/cwp/view.asp?a=3&q=467169>

<sup>92</sup> Virginia Department of Environmental Quality (VADEQ), *Solid Waste Managed in Virginia During Calendar Year 2004*, June 2005, p.i.

<sup>93</sup> PADEP website - <http://www.depweb.state.pa.us/news/cwp/view.asp?a=3&q=467169>

<sup>94</sup> VADEQ, *Solid Waste Managed in Virginia During Calendar Year 2004*, June 2005, p.i

<sup>95</sup> Maryland Department of the Environment, *Solid Waste Managed in Maryland, Calendar Year 2003*, September 2004

exhausted in less than two years.<sup>96</sup> While it is true that the majority of imported waste from New York and New Jersey is disposed in eastern facilities, there is still capacity available. Several landfills including GROWS, IESI Bethlehem and IESI Blue Ridge located in the eastern part of the state have recently received permits to expand their capacity.

Furthermore, there is waste-to-energy capacity available 20 minutes from Wilmington. Discussions with the Covanta (formerly American Ref-Fuel) Chester County facility reveal that they too have significant available capacity in their 1.2 million tons per year plant. While they recently signed a contract with Philadelphia for 100,000 tons per year, they are actively pursuing a long-term contract with New York City (for twenty years), for between 400,000 and 500,000 tons per year. The decision will likely be made after the November 8, 2005 Mayor's race. Acquisition of this contract would most likely eliminate the possibility of any long-term contract with DSWA for more than 500 tons per day. The WTE facilities located in Lancaster, Montgomery and Bucks Counties have less available capacity as they are smaller facilities that primarily serve the needs of their municipalities.

Virginia's acceptance of out-of-state solid waste in general and MSW specifically has increased in recent years. Of the 7.8 million tons of solid waste Virginia received from out-of-state in 2004, 5.9 million tons was MSW, up from 5.5 million tons in 2003.<sup>97</sup> However, according to Virginia's Department of Environmental Quality, as of June 2005, the state estimated approximately 16.1 years of available municipal solid waste landfill capacity remaining. Capacity also remains available at the state's waste-to-energy facilities, such as those in Alexandria and Fairfax County which are actively seeking solid waste inputs.

While it is apparent that available capacity exists in Pennsylvania and Virginia, it is unclear how long it will last as facilities try to acquire long-term contracts.

## 2) *Tipping Fees*

The following table presents the average tipping fees for disposal facilities in Virginia and Pennsylvania according to Solid Waste Digest.<sup>98</sup>

State	Number of Landfills	Average Tip Fee	Number of WTE Facilities	Average Tip Fee
Pennsylvania	49	\$56	5	\$57
Virginia	60	\$40	5	\$46

Specifically, the Covanta WTE facility in Chester County, Pennsylvania quoted a tipping fee between \$43/ton and \$46/ton, depending on length and size of contract. The Covanta

<sup>96</sup> Pennsylvania Waste Industries Association, *PWIA Insight: The Waste Disposal Capacity Crunch*, November 2002

<sup>97</sup> VADEQ, *Solid Waste Managed in Virginia During Calendar Year 2004*, June 2005, p.i

<sup>98</sup> Solid Waste Digest, Volume 14, Number 6 and Volume XV, No. 7



facilities in Fairfax County and Alexandria, Virginia charge fees between \$49/ton and \$55/ton.

Two of the closest landfills in Pennsylvania, the GROWS landfill and Tullytown landfill, both located in Falls Township, in Bucks County, charge \$67.00/ton at the gate, although negotiated contract prices could be lower depending on tonnage and length of contract. Virginia landfill tipping fees range from \$27.50 to \$58 per ton, although negotiated prices would also depend on contract length and tonnage landfilled.

Total disposal costs would have to consider the cost of transporting the solid waste to the facility, whether by truck or by rail, as is discussed below. Loss of revenue for DSWA to support its activities also must be factored into comparative analyses.

### **3) *Transportation Options and Costs***

Obviously, just as solid waste is currently moved via truck within the state, it could also be transported via truck out-of-state. Transportation costs would correspondingly increase with distance to the facility. One waste hauler interviewed estimated that transporting the waste from Pigeon Point Transfer Station (PPTS) to the Chester WTE facility would cost approximately \$10 per ton, which includes roundtrip labor, fuel and vehicle depreciation and maintenance.<sup>99</sup> DSWA estimates that transporting waste from PPTS or Pine Tree Corners Transfer Station to Sandtown landfill would cost between \$25.00 and \$35.00 per ton based on its current contract with Waste Management, Inc. and on past experience.<sup>100</sup> This cost would need to be added to the tipping fee at the out-of-state facility to arrive at the true disposal cost. Increases in fuel costs over the last year have not been factored into these estimates.

While Delaware's waste is transported via trucking, some municipalities, such as Boston and New York City have found that as the distance to the disposal facility increases, rail transport becomes more economical than truck hauling of waste. In fact, more than 50 cars and 200 containers of trash already move daily from northeastern states through Wilmington to landfills in southern states.<sup>101</sup>

This option could potentially be utilized in Delaware as well to transport solid waste to Virginia or other southern states. Norfolk Southern's Edgemoor rail yard is located across I-495 from Cherry Island. John Lassahn, a former Conrail employee specializing in rail marketing, operations and costs, has suggested that in the area between I-495, Hay Road and the City of Wilmington's Waste Water Treatment Plant, space exists to consolidate and load solid waste into 20-foot intermodal containers that are placed on railcars. Railcars can carry up to four of the containers, which can hold approximately 20 to 22 tons of trash each, or up to 90 tons per railcar.<sup>102</sup> Rail haulage costs (to the railroad) would run approximately \$1.50 to \$2.00 per mile per car and include bringing the railcars and containers back empty. Ultimately, transportation costs to DSWA would entail some degree of mark-up on the railroad's haulage costs, as well as costs for leasing the cars and the intermodal containers.

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<sup>100</sup> DSWA responses to questions, December 10, 2004

<sup>101</sup> The News Journal, *Move trash to landfills by rail*, July 25, 2004

<sup>102</sup> Conversations with John Lassahn, December 6, 2004 and October 13, 2005

This scenario could possibly be expanded if necessary for solid waste generated downstate by using existing Norfolk Southern routes situated near those areas.<sup>103</sup>

More research needs to be conducted into the costs of actual routes, as well as the costs to construct the necessary waste handling facilities and to upgrade available sites. But the infrastructure exists to make this a scenario worth considering.

#### **4) *Reverse Flow Control***

When contemplating shipping waste out of state, decision makers need to be cognizant of some states' attempts at reverse flow control of interstate waste. In an effort to get around the *Carbone* decision, states are trying to devise legal ways to restrict solid waste generated in other states from crossing their borders and entering landfills in their states. On September 23, 2004 a House Energy and Commerce Subcommittee passed interstate waste legislation H.R. 4940, the Municipal Solid Waste Responsibility Act of 2004, by a vote of 12 to 4. The bill would allow states to prevent out-of-state trash from entering their landfills without a host community agreement or state permit or contract.<sup>104</sup> Under H.R. 4940, states could limit the amount of trash any incinerator or landfill accepts. The facilities would be required to submit yearly reports to the state on how much and what types of trash they receive. Recycling materials would be exempt.

Around the country, similar bills have been proposed before the state legislatures. While laws passed in 1999 to limit imports of waste into Virginia were deemed invalid by the courts, legislative efforts are continuing to enact similar bills in that state, as well as elsewhere in the country. For instance, in Michigan, where approximately 20 percent of waste disposed of in Michigan landfills originates from out-of-state, Michigan lawmakers recently introduced an assortment of legislation in attempts to end out-of-state solid waste disposal in Michigan facilities. Similar legislation could be proposed in states where Delaware could choose to send its solid waste.

However, it should be noted that this type of legislation has typically invited lawsuits from waste haulers, with court decisions favoring the hauling industry. As such, reverse control does not currently represent a serious threat to sending waste out-of-state.

## **4. Landfill Alternatives**

Until now, this report has mainly examined solid waste management options centered on landfilling as the primary disposal method. The following discussion presents some alternative methods, from the proven and highly utilized waste-to-energy to other developing, but untested technologies.

### **a. Waste-to-Energy (WTE)**

Waste-to-energy technology is an established and well-proven means of municipal solid waste disposal. In 2002, approximately 600 WTE facilities in 35 countries processed 130 million tons of MSW to produce electricity and/or steam. According to the Integrated

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<sup>103</sup> Ibid

<sup>104</sup> NACO Legislative Bulletin, September 24, 2004, [www.naco.org](http://www.naco.org)

Waste Services Association, in 2003 the 89 waste-to-energy facilities operating in 27 states in the United States combusted an estimated 29 million tons, or 13 percent of the MSW produced and generated nearly 2,700 MW of electricity.<sup>105</sup> With European Union regulations mandating the reduction of landfilling, WTE is on the rise in Europe, as well as around the globe. Per capita, the use of WTE is nearly three times higher in countries such as Japan, Denmark and the Netherlands than in the U.S. And since 2001, nearly 50 new WTE facilities are either operating or under construction worldwide.

### ***1) Technology Description***

Simply put, waste-to-energy facilities combust waste to produce energy in the form of electricity and/or steam. A typical WTE facility produces between 400 KWh and 600 KWh per ton of waste processed. The higher the moisture content of the waste stream, the lower the efficiency of the WTE facility. The three main types of WTE technology are:

- **Mass Burn** plants generate electricity and/or steam by combusting in a single stationary chamber unprocessed MSW (i.e., only items too large to go through the feed system are removed from the waste input). The capacities of typical mass burn plants range from 10 to 3,000 tons of MSW per day.
- **Modular** plants, like mass burn plants, combust MSW without preprocessing, but use two vertically mounted combustion chambers. They have significantly smaller combustion capacities than MB plants (5 to 300 tons per day) and are often prefabricated off-site for quick assembly where needed.
- **Refuse-Derived Fuel (RDF)** plants first process MSW by removing recyclable and/or noncombustible materials from the waste stream, which improves combustibility. The remaining waste is then shredded and sorted into a dense uniform fuel known as RDF. RDF may be burned in a dedicated combustor on-site or can be shipped off-site for use as fuel in facilities that “co-burn” fossil fuels.<sup>106</sup> The capacities of dedicated RDF facilities range from 250 to 3,050 tons per day.

### ***2) Management of Pollutants***

WTE technology is not totally benign. In the 1980s, EPA identified WTE facilities as major sources of mercury, dioxin and furan emissions. However since the promulgation in 1995 of Maximum Available Control Technology (MACT) regulations, the U.S. WTE industry has spent more than one billion dollars in retrofitting air pollution control devices (APCDs), resulting in significant reductions in emissions of air pollutants. Since 1995, mercury emissions from WTE facilities decreased by more than 95 percent and dioxin emissions declined by more than 99 percent over the same period.<sup>107</sup>

In addition to APCDs, best management practices also help increase plant efficiency and reduce the formation and release of persistent organic pollutants (POPs) such as dioxins, furans, PCBs and hexachlorobenzene.

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<sup>105</sup> Integrated Waste Services Association, 2004 Directory of WTE Plants

<sup>106</sup> Ibid

<sup>107</sup> Integrated Waste Services Association, [www.wte.org/waste.html](http://www.wte.org/waste.html)

In addition to air emissions, WTE facilities generate two types of ash: bottom ash, which tends to be low in persistent organic pollutants and resists leaching; and, fly ash, which tends to be higher in toxics. Fly ash and the filters that capture it need to be landfilled. Bottom ash may be reused in several applications, including road construction, fill materials and landfill daily cover.

### **3) *Pros and Cons of WTE***

#### **a) *Benefits***

WTE as a MSW disposal alternative offers many benefits, the primary being the 90 percent reduction in volume and 70 percent reduction in weight of the feed waste. By its nature, WTE represents a readily available energy source, and since the implementation of Maximum Available Control Technology, one “with less environmental impact that almost any other source of electricity,” according to EPA.<sup>108</sup>

WTE is also compatible with other waste management strategies such as recycling, with recyclables being removed either on site or prior to waste arrival at the facility. Magnets and other devices also remove metals prior to combustion and from the bottom ash for recycling. Communities with WTE facilities recycle their MSW at higher rates than communities without them.

#### **b) *Cons***

While WTE can boast some positive benefits, it also suffers from a number of negative concerns:

- Creation of hazardous air pollutants, such as dioxins, furans and other persistent organic pollutants (POPs), as well as toxic metals such as mercury. These pollutants have been linked to asthma (due to particulates and sulfur dioxide), immune, nervous system, and cancer effects (due to dioxins and furans and mercury).
- Need to landfill ash – Some debate the safety of beneficial reuse projects using bottom ash and the ultimate fate of landfilling toxic fly ash, fearing groundwater and soil contamination.
- Major capital costs - Construction of a WTE facility represents a major capital investment, typically costing \$100 to \$200 million, depending on the size. Facilities can cover capital costs and operating expenses through tipping fees, the sale of energy and potentially the sale of recyclables.

### **4) *WTE in Delaware***

While DSWA currently relies on landfilling as its primary solid waste management method, the Authority has utilized waste-to-energy in the past. From 1990 through 2000, the Authority sent up to 1,000 tons per day of MSW to the Covanta facility in Chester,

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<sup>108</sup> Nickolas J. Themelis, “An Overview of the Global Waste-to-Energy Industry”, Waste Management World, 2003-2004 Review Issue, July-August 2003, p. 40-47, [www.seas.columbia.edu/earth/papers/global\\_waste\\_to\\_energy.html](http://www.seas.columbia.edu/earth/papers/global_waste_to_energy.html)

Pennsylvania. Also, for a brief period between early 1988 and October 1991, a 600-ton per day waste-to-energy facility operated at the Delaware Reclamation Plant. DSWA did not own or operate the facility, but did provide refuse derived fuel for the facility before operating problems forced its closure.

As recently as 2000, a Tennessee-based company planned to build in New Castle a 25-megawatt WTE facility designed to burn 630 tons per day of waste construction wood and generate steam for electricity. However, extremely strong public opposition to siting the facility helped pass Senate Bill 280 which prohibits the construction of any incinerator within three miles of a school, church or residence. No attempts to site a WTE facility in the state have been made since the passage of SB 280, which is considered by many as a de facto ban on WTE in the state.

DSWA has stated that a WTE facility would require approximately 25 acres; however, the Authority has not performed a formal search for a WTE site. Finding a suitable WTE location in New Castle County under the siting restrictions imposed by SB 280 would appear to be impossible.

## **b. Other Technologies**

While WTE remains the most fully-proven large-scale disposal alternative to landfilling, there are other technologies in various stages of industrial-scale development that merit further investigation as future disposal strategies. Some of these are discussed below. Of course decisions on the use of any of these or other technologies would have to consider capital and operating costs, the availability and quantity of solid waste, competing regional technologies, compatibility with existing solid waste management programs (e.g. recycling), and residues management, among other factors.

### ***1) WastAway***

The Bouldin Company of Tennessee has developed a proprietary process called WastAway that processes unsorted MSW into what it claims to be a stable, safe, odorless product similar in consistency to wood pulp and weighing 40 percent less than the input waste.

At its plant in McMinnville, Tennessee, the company processes 160 tons of MSW per week collected from nearby Warren County. The process takes 30 minutes to transform MSW through shredding, grinding and pressure heating into a product called Fluff. The Fluff can be further treated to create compost and growing media for the nursery, horticultural and agricultural industries and it has applications in soil reclamation and erosion control. The Fluff can also be extruded to make products such as landscape timbers, fencing, and park benches.<sup>109</sup>

Currently, a typical dual-line WastAway system can process up to 100 tons of MSW per day or approximately 30,000 to 40,000 tons per year. It is estimated that a facility of this size would cost from \$3.5 to \$5.0 million.

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<sup>109</sup> [www.wastaway.com](http://www.wastaway.com)

Because of the small scale, this technology does not appear to be a total replacement for landfilling, but it represents a potentially complementary technology that could supplement landfilling if applications or outlets were found for the process end products.

Members of the Delaware Environmental Alliance for Senior Involvement (DeEASI) applied for a \$50,000 federal grant from U.S. EPA to fund a test of the WasteAway process using municipal solid waste generated in Delaware but was turned down.

Under the grant, the Town of Newport would supply 30 tons of MSW to the WasteAway plant in Tennessee for processing into the Fluff end-product would be blended with pine bark and would also be formed into rigid products such as park benches and fence posts. These materials would be returned to Delaware where they would undergo integrity and impurities testing by independent laboratories. DeEASI might reapply in the future.

## **2) *Plasma Arc Gasification***

Plasma gasification is a non-incineration thermal process that uses extremely high temperatures to completely decompose feed wastes into very simple molecules.<sup>110</sup> The extreme heat applied under oxygen-starved conditions creates by-products that include a combustible, energy-rich gas and an inert gas-like slag. When carbon-based waste is used, the product gas is rich in hydrogen and carbon monoxide. This mix, called syngas, can be combusted to generate electricity or steam, producing carbon dioxide, nitrogen and water vapor as the primary atmospheric emissions. It can also be used as a chemical feedstock. The slag, which has low leachate characteristics, can also be utilized in construction, packaging and insulation applications. With the use of available air pollution control devices, generation of air pollutants are generally less than or equal to that of WTE facilities.

Another purported benefit of plasma gasification includes the tremendous volume reduction of input material. Manufacturers claim that for municipal solid waste, the volume reduction exceeds 250-to-1 (99.6 percent). Waste-to-energy incineration offers a volume reduction ratio of approximately 5-to-1 (80 percent). Another positive includes relatively small plant size.

The technology is currently being applied at two facilities in Japan with capacities of 10 tons and 166 tons per day respectively, with the second plant handling a mixture of two-thirds auto-shredder fluff and one-third MSW. Two plants are also planned for Poland. After hiring R.W. Beck to complete a study on the application of the technology to its MSW, Honolulu, Hawaii requested bids on a 1,000 ton per day plasma gasification facility. Georgia has also hired R.W. Beck to complete a similar study for that state's waste.

## **3) *Thermal Depolymerization***

Thermal Depolymerization (TD), also known as Thermal Conversion (TC) is a process that “mimics the natural processes that convert organic matter, under heat and pressure, into oil.”<sup>111</sup> The technology claims to take any number of hydrocarbons and organic feedstocks (including food wastes, tires, mixed plastics, MSW components, and sewage sludge) and

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<sup>110</sup> [www.usplasma.com](http://www.usplasma.com)

<sup>111</sup> United Nations Environment Programme, *Draft Guidelines on BAT and BEP for Municipal Waste Incineration*, October 23, 2003

through the application of extreme heat and pressure under anaerobic conditions, produce clean, solid, liquid and gaseous alternative fuels and specialty chemicals.<sup>112</sup>

The technology is now in practice at a Carthage, Missouri, plant operated by Renewable Environmental Solutions, LLC (RES), a joint venture between Changing World Technologies, Inc. (CWT) and Conagra Foods. As of mid-2004, the plant was producing up to 200 barrels of No.4 crude oil per day using by-products from an adjacent turkey processing facility. The plant aimed to reach peak capacity by the end of 2004, at which time it expected to produce 500 barrels of oil per day,<sup>113</sup> as well as natural gas, liquid and solid fertilizer and solid carbon.

The application of thermal depolymerization to MSW as yet is unclear. CWT sees the technology as one that can be applied in conjunction with other waste management strategies, such as by processing the residuals portion from recyclables collection and sorting, (or treating municipal sewage sludge). However, CWT does note that while the technology has been successfully applied to all of the “constituent organic elements of MSW,” research is still ongoing to design a facility to process a heterogeneous MSW stream.<sup>114</sup> A report by the United Nations suggests that the thermal depolymerization process seems to be most effective with homogeneous waste streams, with results so far being inconsistent for mixed MSW.<sup>115</sup>

## **5. Site a New Landfill**

One possible option for DSWA is to site a new landfill in New Castle County. Under Title 7, Chapter 64, DSWA is exempt from local zoning restrictions, but still must meet the landfill siting requirements under DNREC’s Solid Waste Regulations. DSWA admits that it is not currently considering other landfill sites, since the agency has not been able to identify a suitable site of at least 500 acres in New Castle County. As mentioned in the part of this report that deals with disposal sites for dredged material, the Army Corps of Engineers looked for a similarly sized site near the Delaware River and could not find a suitable location. DSWA states that prior to proposing the expansion of CIL in 2002, its staff prepared a detailed map showing where a landfill could **not** be placed due to airport restrictions and coastal zone impact. The Authority’s analysis indicated that these restrictions essentially limit any future site consideration to land below the C&D Canal.

Even if DSWA were able to identify a suitable location in New Castle County and determine that it meets all of DNREC’s siting requirements (e.g., floodplain, wetlands, public water supply), it would still have to face an inevitably tough public hearing process. DSWA estimates that under a best-case scenario, the time to complete design work, permit preparation, regulatory review, site preparation and construction would probably require ten years before a new landfill would be available. Before dismissing a new landfill as an alternative, a thorough review of potentially-available sites in the county should be completed.

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<sup>112</sup> Renewable Environmental Solutions, LLC website: [www.res-energy.com/technology/index.asp](http://www.res-energy.com/technology/index.asp)

<sup>113</sup> [www.res-energy.com/faq/index.asp](http://www.res-energy.com/faq/index.asp)

<sup>114</sup> Changing World Technologies, Inc. website: [www.changingworldtech.com/information\\_center/faq.asp](http://www.changingworldtech.com/information_center/faq.asp)

<sup>115</sup> United Nations Environment Programme, *Draft Guidelines on BAT and BEP for Municipal Waste Incineration*, October 23, 2003